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The William C. Porter Lecture*
The Mental Deviant in the Military

By
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I CONSIDER it a great honor to have been chosen to deliver the William C. Porter lecture. My personal contact with Col. Porter was singular and brief. In 1944 when I was on the staff of the Neuropsychiatry Consultants Division of the Surgeon General, under General William Menninger, I supervised the thirty-five mental hygiene clinics, known as Consultation Services, in the basic training camps. On one occasion, when we were in urgent need of more psychiatrists for our clinics, General Menninger suggested that I make a flying trip to Mason General Hospital, since, on that day, Col. Porter was graduating from the school of military psychiatry one of his classes composed of what we generally termed "ninety day wonders." Col. Porter was notified and I took the earliest plane out of Washington for New York. After circling over LaGuardia Field for more than an hour, the pilot decided that the ceiling was too low for a landing. For reasons best known to him, he let us down in Allentown, Pennsylvania. By resorting to trains, buses and taxis, I reached the Hospital twelve hours after my scheduled arrival. The initial welcome by Col. Porter was a bit on the frigid side. However, after I convinced him that I had not stopped off en route in New York to see a show, but had conducted myself rather in the manner of a modern Paul Revere, he softened. I was tremendously impressed with his detailed knowledge of not only the individual performance of the members of the class but of their civilian training and experience.

Col. Porter's advice as to which men should be chosen for service in our Mental Hygiene units proved to be excellent. No doubt, this was in part due to the fact that he was one of the first, if not the first, regular Army Medical Corps Officer to recognize the great potential usefulness of such facilities and had maintained a constant interest in their rapid development. In September, 1942, Col. Porter wrote, "The mission of the military psychiatrist is not only to select out the mentally unfit and to care for those who have developed a mental disorder and to eliminate them from the service, but he has the capacity and training, as yet not fully utilized in our army, to contribute to the mental health and morale of the soldiers by use of clinics, similar to non-military mental hygiene clinics, to which the soldier or officer in need of help in the early stages of maladaptation to military life may bring his problems for discussion and assistance." Even after these clinics had multiplied and had been in existence for years, no one ever wrote a more accurate or succinct statement of their mission and their potential usefulness.

Surely to an audience, such as this one,

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there is no need to emphasize the enormous problem that the psychiatrically deviated individual presented to each of the armed services during World War II. There were 387,000 Certificate of Disability discharges for neuropsychiatric conditions and 163,000 administrative discharges for intellectual deficiency, drug addiction, alcoholism, homosexuality and sociopathy.

Dr. Otto Will, in his article on "Psychoses in Naval Inductees with Less than Fifteen Days Active Duty," stressed the fact that it is not only the personal ineffectiveness of the psychiatrically deviated individual but his effect on his fellows, when he wrote, "The man aboard ship or on land who succumbs to a nervous ailment becomes at once an element destructive of group morale, as in him his companions see an intensified reflection of their own fears and insecurity." It is noteworthy that Dr. Will, in this study, carried out at St. Elizabeths Hospital, had no difficulty in finding a hundred patients who had developed psychosis within fifteen days of their entrance into the naval service. Hitschman and her colleagues, likewise, had no difficulty in finding a group of similar size, who had developed psychoses during basic training, in their research study conducted at Bellevue Hospital.

Psychiatric experience leads one to conclude that the great majority of these individuals, who developed psychoses early in their military service, were sick before their induction. The psychoneurosis rate climbs staggeringly among military personnel during a war. It has been estimated that occurrences incident to the individual's military duties were causal in at least 80 per cent of the psychoneuroses which developed in military personnel. The combat rate of psychoneuroses was influenced by leadership, familiarity with assigned mission and fellow personnel, duration of combat, exposure to wet and cold, conditions of attack or retreat, adequacy of rations and ammunitions, etc. etc. However, the psychosis rate rises very little above what one would have anticipated in a similar population living as civilians. In fact, in 31 per cent of Dr. Hitschman's group there was a history of psychiatric hospitalization prior to induction.

Data such as these lead us to a consideration of the whole screening process,—how can one accurately identify and eliminate the mental deviant before he or she enters the service. As you well know, intensive efforts were made to do this. Between January, 1942 and June, 1945, of approximately 15,000,000 examinees, 1,875,000 were finally rejected because of neuropsychiatric disability. The rejection rate of inductees because of emotional defects was in World War II eleven times that of World War I and for intellectual deficiency four and a half times the World War I rate.

During World War II a great deal of investigative work was carried out in an effort to derive accurate criteria, and from them to devise valid test protocols, for sifting out psychiatrically vulnerable inductees. One of the screening questionnaires, which was widely publicized, but never officially accepted, was the Cornell Selectee Index. The Neuropsychiatry Consultants Division of the Surgeon General's Office, in conjunction with the Information and Education Division, developed a questionnaire known as the Neuropsychiatric Screening Adjunct which consisted of twenty-three questions. Its purpose was to detect those questionable individuals who merited intensive personal psychiatric examination to determine their fitness to serve in the military forces. It was early recognized that the great volume of cases for selective service examination and the necessity of using, in some instances, unskilled psychiatric examiners, markedly increased the margin of error. I shall never forget my own experience as one of those examiners. On one day in July, 1942, shortly before I entered the service, I was required to examine psychiatrically more than one hundred men. The official weather bureau temperature reading was nearly one hundred degrees and had we had a thermometer in our little room, just under the roof

of Baltimore's Fifth Regiment Armory, I should probably have had a heat stroke myself. The questionnaires to which I have referred were developed to decrease the case load and to insure greater uniformity in these examinations.

Early in the war, Col. Porter and a group of co-workers at Walter Reed, after studying the past histories of psychoneurotic and psychopathic patients, drew up a list of fifteen unfavorable specific attributes. Among these were, bedwetting beyond four years of age, failure to compete in games involving risk of injury, fear of the dark, preference for playing alone, abnormal shyness, repeated school difficulties, abnormal attachment to mother after puberty, stammering and excessive autonomic system reactions. These workers believed that the presence of six or more of these traits foretold serious maladjustment in the service.

Two years ago I had the opportunity to examine psychiatrically, the most decorated enlisted man of World War II, the holder of the Medal of Honor, the Distinguished Service Medal, the Distinguished Service Cross and many other decorations. In 1958 he was arrested and referred to our Baltimore Court Clinic, charged with assaults carried out when drunk. In addition to my chance to examine this man in our court clinic, I had, as a consultant, the opportunity to observe him at the Veterans Administration Hospital to which we had sent him. He had several of these stigmata in his childhood history, including enuresis until eleven, fear of the dark and a preference for playing alone.

This remarkable soldier's post-war adjustment was tragic. His notorious heroism catapulted him into positions of prominence which required social poise and a talent for speech making, which he did not possess. This was responsible to a great degree for his developing a chronic dependence on alcohol. Happily, current reports of his adjustment outside of hospital are very good.

Rather early in the war a directive came from SHAEF to stop sending so many emotionally unstable junior grade officers overseas. Plans were immediately made, in the camp where I was stationed, to examine all O.C.S. candidates. The men knew that they were sent to me with provisional acceptance if they were passed by me. Part of my examination consisted in physical tests of instability—tachycardia, increased systolic pressure, tremor, sweating palms, hyperreflexia, and dilated pupils. After I observed that nineteen of the first twenty men showed at least four of these six stigmata, I radically downgraded their significance.

And the incongruity of this hero, who had captured one hundred and twenty Germans singlehanded, having been fearful of the dark as a child is, to me, fascinating. I clearly recall an inductee who was referred to our Consultation Service at Fort Eustis because he had been frequently observed weeping during his first week of basic training. He stated that his wife was a severe cardiac and that he knew that she would decompensate because now that he was not at home she would have to carry their year old son and his carriage back and forth to their third floor tenement apartment everyday. I asked him whether his wife's letters had borne out his dire premonitions. He said he had received no letters since he had not given her his camp address because he was afraid of getting bad news. And this young man's civilian occupation was painting flagpoles on top of New York skyscrapers.

The psychiatrists in the basic training camps were impressed with the number of men who showed marked neurotic reactions almost immediately after arrival. Many of these reactions belonged to the syndrome called by one of the British Medical Officers, "separation neurosis." The cases were found often among greatly over-protected and overindulged youths. These generally cleared up rapidly. Then, there were those who had experienced little affection from mother figures as small children and who had recently acquired loving and protective women. Separation from them was very

traumatic. I recall one trainee who shot off his finger in the hope that he would be sent back to his devoted wife. The prognosis for this group of men was less favorable. The former group welcomed emancipation, the latter strongly resisted it. Among the early ineffectives were the strongly latent homosexuals whose defenses were threatened by barracks living. Some of the overt homosexuals also became extremely anxious because of fear of losing control and becoming involved in disciplinary violations.

The great difficulty in predicting adjustment in the Service was brought forcibly home to me in the Army career of one of my friends. In civilian life he was the director of classical studies in one of our great universities. I have never known a man who was less athletic. Whenever one went to his home he was stretched out on his couch reading. He suffered from such severe attacks of angioneurotic edema that his wife had been instructed how to insert an intubation tube, which was kept together with a scalpel in the drawer of the table between their beds. He was the first man of the university faculty to appreciate the threat that Hitler presented and when in 1936 he marched his troops into the demilitarized zone of the Rhineland, my friend advocated armed intercession. Many considered him a jingoist. Soon after the United States declared war he gave up his post at the University and despite the fact that he was then nearly forty, enlisted. To the amazement of us all he completed his basic infantry training at Fort Blanding. He was then used on numerous dangerous intelligence missions overseas and left the service at the conclusion of the war, a captain. And, at no time did he have an attack of angioneurotic edema. When he returned we told him that he had clearly established the fact that his attacks had come from a morbid sensitivity to his wife. This man's success in the Army showed me the crucially important role that motivation plays in adjustment. And there are few psychological elements which are more difficult to evaluate through tests and interviews than motivation.

Egan and his co-workers studied 2,000 men who had been rejected for neuropsychiatric reasons and were later taken into service and found that 80 per cent rendered satisfactory service. Fry reported that a group of men who had been treated for psychiatric disorders in college, and many of whom became officers, performed ably. Their breakdown rate was, of course, considerably higher than those who had not previously been ill, but it is noteworthy that many of them did very well.

Those of us who were practicing psychiatry before the war were often struck by the good records made by some of our patients. In my experience these were generally the insecure, indecisive, withdrawn individuals with marked feelings of inadequacy, who had had few friends. They derived a great sense of potency from being a part of a huge, aggressive body—for the first time they felt they "belonged." Moreover, they found that they had few decisions to make—someone higher up was always responsible for them.

It is generally conceded that all men are fearful in combat. According to a study by Prof. John Dollard, 69 per cent of normal men experience violent pounding of the heart in combat, 44 per cent have a sinking feeling in the stomach, 25 per cent shake and tremble, 18 per cent have cold sweats, weakness or nausea was present in 14 per cent, 6 per cent have urinary incontinence and 5 per cent fecal incontinence. Kaufman's studies in the Pacific corroborated these findings.

One of the most important studies made during World War II, by a medical officer, was carried out by Lt. Col. John Appel. He was sent to Italy in 1944 to study the causes of the large numbers of psychiatric casualties occurring in the 5th Army at Cassino and Anzio. It was his conclusion that all men had their psychiatric breaking point and that this was in "direct relation to the intensity and duration of their exposure."

He found that after 200 to 240 aggregate days of combat most men developed an acute incapacitating neurotic state. They grew hypersensitive to shell fire and became so jittery and overcautious that they became personally ineffective and demoralizing to the new men. Experienced officers in that theatre felt that men reached their peak of effectiveness in the first ninety days. Appel recommended that riflemen should not be kept in a combat area more than six months. He felt that the combat infantryman should have as his survival goal a clearly defined period of combat duty if he were to maintain his mental health, comparable to the Air Force policy of a definite limitation in the number of combat missions. Largely as a result of this study, the Headquarters of Army Ground Forces recommended 120 aggregate combat days as the maximum for infantrymen. The Chief of Staff was sufficiently impressed by Col. Appel's study that he had copies sent to all theatre commanders.

This study of Col. Appel's, as well as those of other psychiatrists, emphasizes the roll of leadership in the incidence of psychiatric disorders in troops. The rate of psychiatric casualties in neighboring companies, fighting under identical conditions, will show consistent differences dependent on leadership. This could even be demonstrated in troops training in the zone of the interior.

The military surgeon has a very important part to play in the prevention of psychiatric disorders in his unit both through his influence on the policies of the command and his handling of disturbed individuals. Some years ago I went to Fort Leavenworth to examine a twenty year old soldier who had been sentenced to death. A maternal half-brother of the soldier had been in a veteran's psychiatric hospital for twelve years, a sister had been in a state hospital with a diagnosis of schizophrenia and another brother had had a psychiatric illness for which he was given fifteen electroshock treatments.

The soldier had impulsively quit high school in his last year because of difficulty in concentration and feeling depressed. He was known by his group for his recklessness. He had once, on a dare, dived seventy-five feet into a shallow river and on another occasion rode on a motorcycle going fifty miles an hour, while standing on his head.

After basic training in the Airborne Infantry, he went south on manoeuvres. His adjustment in his unit rapidly deteriorated. He began to develop the feeling that he was being discriminated against by his fellows. He thought of committing suicide but then began occasionally to think of killing different people in his outfit. He went on sick call complaining that he was sleeping badly and felt all mixed up. He was referred to the division psychiatrist, a major, confiding in him that he had the urge to strike the commanding general. He said he had gone to the chapel the Sunday before with this in mind, but felt sick and left. He also told the major that he was afraid he might kill someone. He asked him to arrange for a transfer to another division, but his company commander refused to authorize transfer. The psychiatrist saw the boy several times. When the patient spoke to him of his fear of killing someone, he naively reassured him by saying, "Here we are all alone, if you wanted to kill someone you'd kill me." The soldier told me, when I examined him, that he was probably the man he had least fear of killing, since he had been so kind to him. Word spread around among his buddies that he had complained of a fear of killing someone. From then on he was addressed as "killer." He appealed to the Chaplain but got no real help from him.

An unfortunate incident then occurred. A number of men had had their pay records lost by the Finance Office and were several months behind in their pay. Things were partially straightened out and a number of these men were called to the office, the patient among them. Since they were in the Army, they formed a line and moved up as their names were called. The patient's name

was the only one that was not called and he was left awkwardly standing there alone. He was convinced that this had been planned by one of his officers to belittle him. He then went to his tent and fashioned a lethal bullet by inserting a piece of brass rod into a blank cartridge case. He loaded his carbine, went to a mess tent, placed the muzzle five inches from the chest of an officer whom he had never before seen and fired. He then stood at parade rest. A general court martial found him guilty of murder. This is perhaps a somewhat extreme and tragic example of how a mental deviant can be mishandled by a group of officers, who should have been capable of preventing such an occurrence.

This case also illustrates the harsh justice that is not infrequently meted out by courts martial. Since the soldier had sought restraint from carrying out his murderous act he was apparently adjudged to be fully cognizant of its wrongfulness. And since he had fashioned the bullet in preparation, it lacked the impulsive quality that is erroneously considered by many to be a necessary element of the irresistible impulse. American psychiatrists are almost unanimous in their advocacy of the Durham Rule as the test of criminal responsibility. By many this is thought to be a radical departure, but in truth, it is the old rule of New Hampshire, in use there for nearly a century. It requires the Court to determine whether the accused is suffering from a mental disease and whether the alleged criminal act is a product of it. If so found, the defendant is adjudged not guilty by reason of insanity. I see no commanding reason why it could not be used in military law.

Let me cite you another case. The defendant was a twenty-six year old man charged with murder, who had very recently been discharged honorably from the Navy. The case occurred in a state in the far south. Because of the nature of the crime, the prosecutor asked the Veterans Administration to examine the accused psychiatrically. They, in turn, referred him to a psychiatrist on active duty at a Naval Air Force station. This psychiatrist concluded that the defendant was a sociopath and that the homicides were in the nature of "a severe temper display in an immature character." Since the law of the state was similar to the military law on criminal responsibility, his report unhesitatingly declared the accused sane and responsible.

The man's very able defense counsel asked me to examine his client. In many respects the case was an extraordinary one. The horrible crime was surely unusual—a son stealing into his aged parents' room while they were asleep and stabbing them both to death with a bayonet.

The slain father had been a remarkable man. He was the son of a Presbyterian minister, but had had little formal schooling. However, he could read Latin, Greek, Hebrew, French and German and easily passed the state wide examination for teachers, thus becoming qualified to organize his own school. In a wing of his house he established a school for his three daughters and his son. He did this because he desired to keep them separate from the other children of the county, fearing that they would contaminate them with their godless ways. His son, our patient, told me that he never beat his children, being an avowed pacifist. Instead he lectured them endlessly about their deficiencies. He recalled that his father had once made him run a half mile, because he had not prepared his school assignment, and had run the entire distance with him, all the time gasping admonitions.

The son had enlisted in the Navy at twenty-two, over the vigorous protests of the father. During his four years in the Navy he broke violently with the family traditions—he smoked, drank, had three gonorrheal infections and acquired several tattoos. His service record was undistinguished. He was not a disciplinary problem and was at no time referred to a psychiatrist. After discharge he loafed about the house for four months. He was very restless and moody. His idleness enraged his father, who

implored him to assist him in his very successful lumber business. He finally gave in, but everything that he did was criticized by his father, who discharged him and then reemployed him. He commented on this to me, saying, "He never seemed as if he wanted me to get ahead or anything."

Without expressing the slightest emotion, he related to me that he thought of killing his father one week before the homicides. The evening of the murders he took a girl to a neighboring town to hear Elvis Presley sing. When asked when he decided to kill his father he said, "It wasn't on my mind too much until I started home. I enjoyed Presley very much, I had heard his records a lot." When asked why he killed his mother too, he responded with the kind of deviant logic that schizophrenics employ, "I didn't want her to know her son had done it. She had a bad heart, and if she had found out it would have been pretty bad on her." After the homicides he threw the weapon and his bloody clothes into the creek.

Later in the examination, when asked why he had slain his father, he replied, "I have tried to figure out myself just why I did it. I know I say this trouble I had with my father and all were responsible, but I know that's not a good reason. I just don't know why." He was given permission to attend the funeral because he wanted to view the bodies of his parents. There he conducted himself with amazing composure.

When the members of the family were interviewed they said that their father had thought that his son was developing a mental disorder and had conferred with them about getting him to a psychiatrist. A clinical psychologist's report indicated that the patient had very good intelligence but that his flattened affect and his seriously deviant thinking were characteristic of paranoid schizophrenia. This confirmed our own clinical diagnosis. The Court found him not guilty because of insanity.

This seems to me to be another instance of a military psychiatrist taking a rigid, dogmatic view of a case of deviant behavior, focusing all of his attention on the criteria of responsibility, rather than approaching it with the broader vision of the clinician.

When Dwight D. Eisenhower was President of Columbia University, he established the Conservation of Human Resources Project under the direction of the economist, Eli Ginsberg. Professor Ginsberg had been one of the chief civilian advisors to the Surgeon General of the Army during World War II. Professor Ginsberg and his able staff of co-workers have published three volumes on the Ineffective Soldier. The third, entitled "Patterns of Performance," published by Columbia University Press last year, is devoted to a sample study consisting of 72,700 men inducted into the Army during the last four months of 1942, who proved to be ineffective at some point. They might be termed the mental deviants. This is a little more than 4 per cent of the total number inducted during this period.

Of this group of ineffectives, slightly more than half were discharged during their first year of service. Only about one fifth of the ineffectives discharged had seen combat. Of this entire group of ineffectives, 56 per cent were discharged with the diagnosis psychoneurosis, 9 per cent with the diagnosis of psychosis, 28 per cent because of inaptitude, and 7 per cent because of undesirability.

Many data of interest and importance were developed by this study. Men with only a grammar school education or less had two and a half times the rate of ineffectiveness of those better educated. Less than one out of twelve with a high school education proved ineffective. This finding is typical of almost all human adjustment studies. Criminological studies of the socially maladjusted who are sent to prisons show the same type of discrepancy on the basis of educational achievement. The chief factor involved is believed to be *not* the native intelligence nor the amount of knowledge possessed by the individual but the personal characteristics of planfulness and perseverance that are involved in securing an education. On the same basis, a wise old judge once said to me

that any criminal defendant who appeared before him with an account in a savings bank was sure to get probation.

The ineffectiveness of these soldiers became initially manifest in more than half through their somatic complaints. Those whose ineffectiveness first became known through disciplinary infractions had had a very high rate of ineffectiveness in civilian life prior to induction. This was particularly true of the alcoholics. Throughout this study one finds a parallelism between the serviceman's adjustment in civilian life prior to induction and his effectiveness in the military service. The authors remark, "A man's ability to perform in the Army or in civilian life depends not only on his emotional stability but also on his intellectual-educational backround, his skills, his motivation and the duty to which he is assigned."

They conclude that screening alone, no matter how intensively carried out, could not have eliminated these mental deviants, that much of the responsibility rests upon the way the Army managed its men. They recommend that those involved in the future in the screening of men for military service, concentrate on the marginal group, consisting of: (1) Those with less than an eighth grade education; (2) Those not accounting for significant periods in late adolescence or adulthood—suggesting their possible residence in a psychiatric or penal institution; (3) The broken marriage group; (4) Those who had married when very young; (5) Law breakers; and (6) The older age group men.

It is true that Mr. James Bennett, the Director of Federal Prisons, and others have claimed that men released from probation and from prisons so that they could enter military service did about as well as most inductees. But, it must be remembered that this was a group carefully selected by prison authorities and was not composed of mentally defective and recidivistic criminals.

The Ginsberg study revealed that a large number of those who failed during their first year had gone directly to divisions to fill in. Likewise, Col. Appel concluded that there was less likelihood of men breaking down early in combat, if men trained together were sent up in small units, rather than as individual replacements. This policy was accepted by Army Ground Forces toward the close of the war.

The Ginsberg report also criticized the assignment system for sending up thousands of poorly classified men from reception centers in wholesale lots, resulting, for example, in large numbers of men on occasion being sent to signal units who had less than a fourth grade education.

The conclusions and recommendations of the Ginsberg study were: (1) The military should have a more carefully focused selection system; (2) Better use should be made of assignment and reassignment systems. Only about one man in twenty who failed during the first year of service was ever reassigned; (3) Psychiatry should not be relied upon more heavily than experience has justified. A man's emotional stability is only indirectly related to his ability to perform effectively—intellectual ability and motivation are also key elements; (4) Since leadership plays a vital role in the effectiveness of troops, considerable resources should be devoted to the indoctrination and training of supervisory personnel; (5) Since motivation and the will to carry on are so important, care should be exercised that supporting services, such as the medical service, will support rather than weaken them. The medical corps officer has come to recognize this responsibility and the policy of not over sympathetically babying his patient but encouraging him to carry on and not let his unit down, is emphasized at all levels; (6) Personnel policies should be attuned to the basic concepts of equity. I shall never forget my chagrin when I asked for questions after having completed a lecture on adjustment to the Army to new troops at Camp Stewart. A northern Negro inductee arose and asked me how a soldier could be expected to have high morale when on

changing trains at Atlanta the M.P. forbade the Negroes using the station entrance reserved for whites; (7) Long range planning and greater stability of personnel policy is a necessity.

Another important study of the mental deviant in Military Service appeared in the volume published by the psychiatrist, Norman Brill and the biostatistician, Gilbert Beebe in 1955, entitled, "A Follow-Up Study of War Neuroses."

This exhaustive study showed that of the men, who after thorough social and psychiatric investigation were considered from a psychiatric point of view clinically normal prior to entry into service only slightly more than 2 per cent had at least one admission to a psychiatric hospital for psychoneurosis or for a character disorder. Of those who could be considered to have been in the psychiatrically marginal or predisposed group before entry into service, 35 per cent were hospitalized for these conditions. However, they caution that had induction examiners rejected the entire marginal psychiatric group, nearly one million additional men would have been excluded, who never broke down.

Col. Brill's survey of men five years after they had broken down psychiatrically in the service showed less dire effects than had been anticipated. He reported, "There is relatively little change in those who were previously normal or overtly neurotic."

Col. Brill advocates a larger use of marginal psychiatric groups in future large scale mobilizations and "a continuation of the trend away from reliance upon superficial induction screening and toward more effective utilization and prevention" and "there is need for a more careful assessment of man power requirements in terms of capacity to function at a wide array of particular jobs, rather than just in combat." He also concludes, I assume, largely on the basis of the British experience, that it is possible that in a defensive war at home the psychiatric problem would be a smaller one. In such an action the motivation of the participants is necessarily high.

It is heartening to find that military psychiatry has not lapsed into the state of somnolence after World War II, that occurred after World War I. Under Col. John Caldwell and the extraordinarily able present chief of Army psychiatry, Col. Albert Glass, significant advances have been constantly made. Now, identification and treatment of psychiatric disorders occur early and few are hospitalized. Every effort is made to keep the men on duty and have them treated as out-patients. The psychiatric discharge rate is down to 7 per 1,000 per annum. Psychiatry has recently established a symbiotic relationship with the Provost Marshal's department, so that many of the disciplinary cases formerly discharged are returned to effective duty through psychiatric treatment.

No one knows what the future will hold—but it is my belief that Military Psychiatry is now better prepared to meet any emergency that may come, than at any time in the past. A new generation of military psychiatrists is being developed with a broad psychiatric orientation. For them, Col. William Porter should serve as a model because of his high sense of duty and his complete dedication to the military service.

The Role of Education in Mental Health*

By
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WORLD War II provided an unprecedented opportunity for a comprehensive assessment of the state of health prevailing in a large segment of the adult population of the United States. Ultimate victory and preoccupation with a prompt return to a peacetime way of life lessened considerably the appreciation of the importance of the statistics which had been collected during mobilization. These figures showed for the first time some shocking facts about the health of our nation. Half of the 16,000,000 persons examined for the draft had been found to have physical or mental defects. This group "consisted of five million rejectees, a million and a half men with rejectable defects who were inducted into the Armed Forces and rehabilitated, and an additional million and a half who were inducted that had to be discharged for physical and mental defects not acquired in the service."[1,2] Of the five million rejected, approximately 1,900,000 were for neuropsychiatric disorders.[2] During the war, 850,000 members of the Army were hospitalized for neuropsychiatric illnesses. Finally, neuropsychiatric disorders accounted for 388,600, or 37 per cent, of all disability discharges.[3] In 1945, looking into the future, it was estimated that in subsequent years there would be approximately 100,000 youths 18 years old available for military service each month.[4] Of these, 22,000 were expected to be rejected, 6,100 of whom would have mental disease and 3,000 of whom would fail to meet educational standards. A few years ago, slightly more than a decade after World War II, a survey by the Ford Foundation[5] indicated that the Federal Government was still spending more for the pensions and treatment costs of psychiatric casualties among veterans than all the States combined were spending on psychiatric cases among non-veterans. More than any other circumstances, these experiences have prompted an increasing awareness and concern with the problem of mental health in our country. Several groups, especially the Joint Commission on Mental Health and Illness, have been conducting comprehensive surveys in order to define the problem better and to devise the means by which it eventually might be resolved. If it could be brought into sufficient sharp national focus, there probably would be little dispute with the conclusion that mental illness constitutes the most serious health problem confronting our society.

Besides those extracted from World War II experiences, a variety of statistics are available to establish the present magnitude of the problem. It has been estimated that approximately 17,500,000 Americans suffer from some type of psychiatric disorder sufficiently severe as to warrant treatment. Of these, only slightly more than ten per cent—about 1,814,000—are recognized during the course of any year.[6] Expressed in somewhat different terms, it is estimated that sometime during the course of their lives, ten per cent of Americans will require psychiatric care for one reason or another. Half of these will need to be hospitalized. There are four million alcoholics. A few years ago it was reported there were more suicides than total deaths resulting from the five most common contagious diseases.[2] While there are no figures available to indicate the number of persons suffering from incipient or less severe psychiatric disorders, some evidence in this regard is provided by the estimate that forty to sixty per cent of all those who seek any form of medical attention do so for illnesses which are due entirely or in part to mental or emotion-

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al disturbances. Of particular significance to the general medical situation is the accumulating evidence that the course of any disease may be influenced by the emotional status of the patient. Also, a large number of previously considered organic diseases, among them some which are increasing in incidence and for which no consistently effective therapeutic measures are available, have strong psychiatric features which contribute to their development and progression. Finally, the direct and indirect cost of mental illness is estimated at three billion dollars each year.[7] Of this, something in excess of one hundred millions is spent for the purchase of the so-called tranquilizing drugs.

It is disturbing that in as an enlightened society as ours is supposed to be a mental health problem of such magnitude should exist. From a military standpoint, its potential adverse influence upon the maximum effectiveness of manpower utilization in a total mobilization for national defense becomes a matter for considerable concern.

Presently, our society is preoccupied with a technological struggle for survival. The critical importance to national defense of our ability to surpass Russia in the satellite and missile race is continually emphasized. To assure and protect our position, an intensive effort to expand and broaden education in the physical sciences has been initiated. An increasing number of our most promising young people are being encouraged to seek careers in these disciplines. Ours has become a highly technical and industrial society. Our remarkable accomplishments and our ability to solve almost any problem have provided us with the highest material standards of living of any nation in the world. Perhaps the very nature of such a society provides a favorable setting for the development of a serious mental health problem and allows it to exist without appropriate recognition and attention. As we are dedicated to a material security emphasizing accomplishment and success, it has become increasingly expedient to minimize or disregard those psychologic, philosophic, and sociologic aspects of living which cannot be reduced readily to objective values and which do not provide tangible evidence and assurance of progress toward one's goals. We have had very little inclination to learn about ourselves.

In a recent survey conducted by the Joint Commission on Mental Illness and Health[8] one out of every four healthy adults indicated that some time during the course of his life he had felt sufficiently troubled as to need help. One in seven had sought it—from clergyman, family physician, or psychiatrist, in that order. Not always were such individuals able to recognize their troubles as emotional; instead they were inclined to view their difficulty as organic or external to themselves. Whether perceived as psychological or not, their problems appeared to have mental or emotional components whose recognition required an understanding of the behavior of themselves and others. Of particular interest was the obervation that the younger and better educated groups participating in the survey—those who had been exposed to the most mental hygiene information in school or in their personal reading—had a much better comprehension of the psychological nature of their problems.

Among emotionally disturbed patients, there is a remarkable paucity of real understanding of their problems and conflicts, their personalities, behavior, emotions, and attitudes. In my own experience with over ten thousand psychoneurotic or psychosomatic patients in a mid-western university hospital and outpatient clinic setting, it was striking not only how few of them had any insight, but how difficult it was for them to accept the fact they were suffering from an emotional illness or personality problem. Actually, this is not difficult to comprehend and explain. Few people, regardless of their educational or economic attainments, ever have had much of an opportunity to learn about and understand their personalities, patterns of behavior, and emotions. Their

early life adjustment usually has been directed and supervised by parents who represent a wide variety of subcultures and who, by chance, may be well—or poorly adjusted, emotionally stable or unstable, informed or uninformed, and possessing realistic or unrealistic standards and values. In due time they have been incorporated into an educational system which supplies learning and discipline but in which little if any attention is directed to emotional adjustment and personality development. In their environment they are confronted by a variety of experiences and influences which they must evaluate and deal with in accordance with—or in defiance of—a set of standards and values which for the most part have originated with their parents. By the time adult life has been reached, the individual's personality, behavior, attitudes and ambitions have been significantly influenced by the manner in which he has reacted to these influences and experiences. At no time, though, has he had much of an idea as to what has been going on, nor has he had available an entirely dependable and properly informed person to whom to turn for advice and guidance. So prepared, he joins a highly competitive society. Being an adult he is presumed to be able to make the proper selection of a mate and a successful adjustment in marriage. Being married he and his similarly prepared wife are presumed to be able to raise children properly. Being the head of a family he is presumed and expected to be able to accomplish and maintain the standards of living society has established and prescribed. Having presumed so much and understood so little, it is not surprising that the intervention of an illness diagnosed as emotional should be contemplated with bewilderment and skepticism. Should he thereafter receive psychotherapy, it is likely he would be required to review the various events, influences and experiences in his life from an entirely new and different point of view. It has been stated that the character traits and habits of an individual are formulated in the first six to ten years of life. What a person is at eight years is a fair indication of what he may be expected to be at eighteen or twenty-eight years. Obviously, in one way or another these patterns may be modified so that every maladjusted child does not grow up to be a maladjusted adult. However, with only few exceptions, an adult who seeks treatment for the first time of a psychiatric, emotional, or psychosomatic disorder presents an illness which is the culmination and often the end result of psychopathologic processes originating early in his life. Regardless how it might manifest itself, this is a chronic illness with well crystallized and frequently refractory features.

So far, medicine has not been able to contribute significantly to the resolution of the mental health problem. With a few notable exceptions, efforts to date have been directed almost entirely to the treatment of psychiatric and emotional diseases. Hospitalized patients are far better cared for and more successfully treated than previously; outpatient and office psychotherapy have expanded tremendously; the duration of the severe features of the illness in many instances has been shortened. In accomplishing this, a seriously inadequate *number* of psychiatrists and their supporting paramedical personnel—psychologists, psychiatric nurses and psychiatric social workers—is struggling to keep pace with the steady flow of patients who present themselves for treatment. By and large, these psychiatrists are engaged either in the supervision of large groups of patients to whom little individual attention can be given, or in time-consuming and costly individual psychotherapy which can be made available only to a very few. An increasing number of physicians are specializing in psychiatry and a growing number of non-psychiatric physicians are becoming more interested and proficient in the diagnosis and treatment of mental and emotional illnesses. Medical schools are endeavoring to provide better psychiatric orientation to their students. Psychiatric research has contributed a large volume of important knowledge about mental and emotional disturbances and a beginning elucidation of neurophysiologic and

neurochemical mechanisms. A rapidly growing series of neuropharmacologic drugs—the tranquilizers, psychic energizers, hallucinogenic agents, and so forth, has become available. Initially, some of these were greeted with the naive hope that they would effect prompt and painless cures. Gradually, they have assumed their proper roles of valuable therapeutic aids when judiciously used and important research tools in the laboratory.

The critically important detail is that there has been no decrease in the number of psychiatric patients. Although somewhat controversial, the number actually may be increasing. The incidence of mental disorders requiring hospitalization has grown more rapidly than the population. Also, some of the organic diseases which are believed to have prominent emotional features, such as essential hypertension and peptic ulcer, are increasing in incidence. Under existing circumstances it is highly unlikely there will ever be enough psychiatrists, psychologists and social workers to adequately treat those individuals whose psychiatric disorders are finally recognized. Furthermore, it is conjectural whether simply treating or attempting to forestall the overt psychiatric disorders will ever appreciably decrease the reservoir which exists. In assessing manpower requirements for dealing with the problem of treatment of mental illnesses the Joint Commission has concluded, "An efficient utilization of mental health personnel probably is going to involve something other than time-consuming face to face relationships between a single professional person and a single patient. The number of people who need help and the number of people prepared to give help are so out of proportion that time and arithmetic will not permit such individual face to face approaches to be meaningful from a logistic point of view. Perhaps experience in the epidemiology of other disorders will suggest solutions. Just as typhoid fever was never brought under control by treating individual cases of the disease but rather by discovering and taking steps to remove the sources of the disease, so we may find that time might be spent much more effectively in prevention, in research, or in public health approaches to mental disorders."[7]

It is unrealistic to expect that the medical and allied professions alone can or will resolve the problem of mental illness. Far more fundamental at the present time is the role society must play. Only when society becomes determined that something must be done and is willing to devote its ingenuity and energy to its accomplishment can substantial progress be made. The incidence of mental illness will decline only when those factors responsible for its development have been reduced or eliminated.

Mental Health has been defined as "the ability of people to meet and handle problems; to make choices and decisions; to find satisfaction in accepting tasks; to do jobs without avoiding them and without pushing them onto others; to carry on without undue dependency on others; to live effectively and satisfactorily with others without crippling complications; to contribute one's share in life; to enjoy life and to be able to be loved."[9] Although the accomplishment of these abilities is certainly more difficult than it might seem to be on superficial appraisal, there is nothing that is not possible for a properly prepared person. While the causes of mental and emotional illnesses may be multiple and not entirely elucidated, there remains little, if any, doubt that the manner in which an individual relates to his environment, the manner in which those characteristics with which he is endowed are shaped and influenced, are of basic importance to the development of healthy or unhealthy personalities, behavior patterns, attitudes and adaptability. To provide an individual with a practical and realistic comprehension of what a healthy emotional and environmental adjustment entails and some knowledge of the manner in which such an adjustment can be accomplished would seem to be almost a primary requirement of a truly enlightened society. The more complex the environment and its demands, the more

essential does this knowledge become.

The most rational and promising means of resolving the problem of mental illness is the education of people in their formative years so that they are better equipped to understand themselves and to deal with their environment. Children and youths must be more effectively prepared to assume the responsibilities of adult life. Young adults must have a realistic concept of marriage and its requirements. Especially should they be more aware of the psychologic responsibilities of parenthood and their proper role in the upbringing of children and the management of healthy family interrelationships. For our young people, the benefits from the latter obviously remain for the future; present day parents must be appropriately oriented so that they more effectively contribute to and cooperate with their children's development. The Joint Commission has made this pertinent statement, "We know enough to say with some certainty that it is economically and morally sound to spend on children most of what little professional time is available where often some real progress can be made and where future disorders can be prevented or modified."[7] The vital participation of parents will provide them with an opportunity to acquire more personal insight and the means by which they might live more stable and better adjusted lives.

These objectives can be accomplished by the establishment of a coordinated educational program appropriately incorporated into the activities of those institutions which presently are the major influences upon the life and development of the individual—the home, school, the church, and the military. Existing mental health activities and institutions for the care of mental and emotional illnesses obviously must play essential supporting roles in the program and be coordinated with it. Certainly for children the program should become an integral and required part of their education and initiated in the beginning grades. It must be geared to their development, broadening exposures, and increasing responsibilities. The media for the program are already available in our primary and secondary schools, parent-teacher organizations, churches, military training centers, civic groups, and a sizeable number of other cultural and educational institutions. Encouraging trends have already manifested themselves. The increasing numbers of child guidance and mental hygiene clinics, marriage counseling agencies, community mental health organizations and efforts to more effectively cope with juvenile delinquency, the availability of counseling and the inclusion of courses in mental hygiene and related subjects in the curricula of some schools, the training in psychology provided to some members of the clergy, and the frequent appearance of excellent educational books and articles in popular magazines are especially noteworthy. Not directly related to the educational program but nevertheless of vital importance to the basic problem is the progress that has been made in slum clearance and the provision of better housing, the wider availability of recreational facilities, and the lessening of prejudice and discrimination. Critically needed now is the leadership to sharpen the awareness of society to the serious magnitude of the problem and what can be done, and then to bring together and coordinate the activities of the many disciplines necessary for the development and establishment of the program. A master curriculum spanning the years of primary and secondary education must be prepared. From this the material to be presented each year can be determined. Cogent, yet simple, reference matter and texts will need to be written. The appropriate participation of parents and others will require definition and should be coordinated with the academic program. Especially difficult, yet of critical importance, is the proper training of those who will assume the responsibility for teaching and those who will provide the long-term coordination of the various activities. New knowledge gained from research must be incorporated promptly into the cur-

riculum; objective measurements of accomplishments will need to be established. A host of problems, some immediate and obvious, others which will emerge during the course of more detailed implementation, will require solution. The undertaking is indeed a formidable one, but certainly not more so than many others which the American people have accomplished.

At stake, really, are the futures of the 42,000,000 young people presently in our schools and the countless millions who will follow them. We have little choice but to use the present limited means at our avail and to seek new and more effective methods of treatment for those who already have developed mental and emotional illnesses. When we shall have lessened the probability for these illnesses among our developing young people we then will have taken a truly major step toward the resolution of our mental health problem.

REFERENCES

[1] Senate Committee Print #4, National Health Act of 1945 "Need for Medical Care Insurance," Memorandum prepared by Bureau of Research and Statistics, Social Security Board, March, 1946, p. 5.

[2] Menninger, Wm. C., M.D.: *Psychiatry in a Troubled World,* The Macmillan Co., New York 1948, p. 432.

[3] Appel, J. W.: Incidence of Neuropsychiatric Disorders in the U. S. Army in W.W.II, Am. J. Psych., 102:433-436, January, 1946.

[4] *Periodic Reports of Physical Examinations,* Vol. 3, Statistics, Nov. 1940-Sept. 1945, National Hq. Selective Service System.

[5] Ford Foundation, 1955 Annual Report.

[6] Plunkett, R. J., M.D., and Gordon, J. E., M.D.: *Epidemiology and Mental Illness,* Basic Books, Inc., New York, 1960.

[7] Albee, G. W., Ph.D.: *Mental Health Manpower Trends.* Basic Books, Inc., New York, 1958.

[8] Gurin, G., Ph.D.; Veroff, J., Ph.D.; and Feld, S., Ph.D.: *Americans View Their Mental Health,* Basic Books, Inc., New York, 1960.

[9] Appel, K. E., M.D.: *Mental Health, Mental Health and Mental Illness Social Work Yearbook,* 1957. Kurtz, R. H. (ed) National Assoc. of Social Workers.

LATE NEWS

The following news items were received too late to include in the "Notes" section of this issue of MILITARY MEDICINE:

Dr. Luther L. Terry was appointed as The Surgeon General of the U. S. Public Health Service to succeed Dr. Leroy E. Burney, effective January 31, 1961. Dr. Terry is a native of Alabama, and is a graduate of Tulane University School of Medicine (1935). He has been an instructor in medicine at Washington University (St. Louis) and the University of Texas (Galveston); also an associate professor at Johns Hopkins University School of Medicine. Prior to this appointment as Surgeon General he was Assistant Director of the National Heart Institute, Bethesda, Md.

Rear Admiral Edward C. Kenney, Medical Corps, U. S. Navy has been appointed as The Surgeon General of the Navy to be effective upon the retirement of Rear Admiral Bartholomew W. Hogan. This will be about February 15. Admiral Kenney has been the Deputy Surgeon General of the Navy since June 19, 1959. He is a native of Ohio, and received his medical degree from the University of Cincinnati Medical College. After graduation in 1929 he entered the Medical Corps of the Navy.

The Community in Disaster*

By

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In this paper the author has attempted to relate the occurrence of disaster to community health and to indicate those areas which are considered to have been neglected in past disasters. The ubiquitous nature of natural and man made disasters in the United States is pointed out together with the common pattern which these events have assumed. An attempt has also been made to utilize the format of an epidemiological study as a structure within which to discuss the various facets of disaster together with an interpretation and discussion of these facets in the light of essential mechanisms for controlling certain medical aspects which can be anticipated upon the occurrence of catastrophic events.

INTRODUCTION

DISASTER! What is disaster? Webster defines it as "sudden and extraordinary misfortune; an unfortunate event; a calamity." By this definition the limits of the event have not been defined since its occurrence may involve one person, a family, a community, a state, a nation or even the entire world! Therefore, for the purpose of this paper, it is necessary to modify the accepted definition in order that logical and coherent discussion of the relationship of health agencies to such events may be carried out. In keeping with this concept, disaster is defined as "a sudden and extraordinary misfortune with an impact of such magnitude that sufficient members of the community are affected to a degree that the *normal* or *usual* socio-cultural institutions of the community are taxed up to or beyond their capacity for dealing with the situation." In other words, a disaster is not a disaster, under our definition, unless the effect is such that the normal course of events in the community are disrupted.

Disaster may occur in many different forms and may be classified under many headings. They may be natural such as earthquakes, tornadoes, floods, epidemics of disease, etc., or man made such as fires, explosions, train wrecks, airplane crashes, atomic bombings, etc. They may be economic such as the economic collapse of 1929, or social such as the recent incident at Little Rock, Arkansas. It is considered, however, that these classifications are only of academic interest. For regardless of the cause—natural or man made, economic or social—the effects on the community are such that the impact of the event is of such magnitude that the normal course of events within the community are disrupted. The event may be of such a nature that a sufficiently long space of time is available to permit planning and execution of measures to meet and deal with the situation in an orderly manner, as occurred with the threat of the Asian Flu epidemic in the fall and winter of 1957-58. Therefore, it again becomes necessary to delimit our definition to those *unforeseen* events having a *sudden* impact such that the life and/or the health of the community is in jeopardy.

Governments were fundamentally established to regulate and control natural and human phenomena in order that there should be an orderly conduct of human affairs. Community health agencies evolved as a result of the threat of the phenomenon of communicable disease acting to disrupt the

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* Awarded HONORABLE MENTION in the 1960 Sir Henry Wellcome Medal and Prize Essay Contest.

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All statements and conclusions (except those which show reference to the bibliography) are those of the author and do not necessarily reflect the policy or doctrine of The Department of Defense, The Department of the Army, or any official group.

normal course of human events and for many years community health agency efforts were directed toward the control of the impact of these diseases upon society. Since the turn of the century with the major medical developments and discoveries which have occurred, the effects of many of the epidemic communicable diseases have lost much of their significance as disruptors of human events. Through the practices of epidemiology and environmental sanitation, community health agencies have been instrumental in reducing the threat of communicable disease to manageable proportions. During this period health activities of government have been expanded to encompass many other areas which affect the health and welfare of the community. Programs in maternal and child health, chronic disease control, accident prevention, crippled children programs, rehabilitation of the disabled, school health and many others have become areas of effort. With the advent of the atomic age, radiological hazards, although not completely accepted as a community health function, are assuming importance as one of those events with which society is vitally concerned as a disruptor of the natural flow of human events. It is not believed logical to deny that any event which affects the life or health of the community is not of vital and immediate concern to all community health agencies. As has been pointed out, epidemiological process is a traditional area of health activity, and when interpreted in the broad sense as being devoted to the study of cause, effect, and control of anything which adversely affects the life and health of the community, it logically may be applied to any event or situation, be it communicable disease, radioactive hazards or disaster.

With the foregoing in mind, it is considered appropriate to look at a disaster a little more closely in order to determine in which areas community health agencies might be concerned. Disaster, as we have defined it, disrupts the normal course of human events; it brings the threat of disease with the impairment of life and health and therefore involves all health agencies in their traditional areas of activity. On examining the disaster a little more closely, however, it is noted that an integral part of the disaster is the destruction of life and occurrence of injury. Cannot disaster per se then be considered as an epidemic of trauma? If the answer to this question is in the affirmative, then should not all community health agencies be vitally concerned, not only with the epidemics of disease which frequently are sequelae of disaster (secondary effect) but also the primary epidemic, i.e., the epidemic of trauma.

History

The first and usually a very important step in an epidemiological study is to define the scope of the problem as history reveals it. Therefore, in a perusal of the records, it is found that the loss of life and injury in disaster constitute an area of major importance in the field of health.

The Metropolitan Life Insurance Company prepared a study of catastrophic events or disasters (exclusive of military aviation) over a ten-year period 1937-1946. During this period, there were 918 disasters involving 12,917 lives. Three-fourths, or 75% of these, were man made and one-fourth, or 25%, occurred as the result of natural phenomena; an average of 92 disasters per year or two per week with an average of 13 fatalities per disaster. This study included only those events in which four or more persons were killed. If those disasters resulting from motor vehicles of all types are eliminated, there still remain 648 from other causes accounting for 11,158 deaths.[21] Thus 75% of all disasters result from causes over which little or no direct control may be exercised.

The American Red Cross reports on disasters in which the Red Cross participated from 1925 to 1955 show that 23,244 lives were lost, and 134,222 injured, 773 lives lost and 4,474 injured per year over a 30-year period.

In the disaster from natural phenomena, tornadoes far outrank any other as a cause of death and injury. American Red Cross experience in the 30 years between 1925 and 1955 shows that 3,644 deaths and 45,681 injured occurred from this cause. In respect to man made disasters, fire exceeded all others, causing 3,289 deaths and 16,433 injuries. Table I indicates Red Cross experience:

TABLE 1

RED CROSS EXPERIENCE (1925-1955) IN DISASTERS[23]

	Type of Disaster	*Mortality*	*Morbidity*
Natural	Tornadoes	6,117	46,681
	Floods	2,534	25,542
Natural	Hurricanes	3,644	15,516
	All Other Storms	240	4,657
Man Made	Explosions	4,288	8,702
	Fire	3,289	16,433
	Wrecks	2,797	7,153

REPORTING

To continue in the vein of an epidemiological study of disaster, there is the area of reporting. With most disasters taken individually, it is found that deaths and missing are fairly accurately reported. The data for morbidity reporting from trauma is inadequate, however, as a result of the confusion and disruption of communications during the immediate post impact period and continuing until some semblance of communications have been re-established.

All ages, sexes and races are equally susceptible to morbidity. Mortality, however, will be greater among the very young, the very old and the debilitated as a result of the greater intolerance to trauma and shock.

GEOGRAPHY AND CLIMATE

Geographic considerations per se can be eliminated in the occurrence of man made disasters. In natural disaster, however, this is not so. The geographic position of the United States makes it subject to a variety of natural disasters. The more important physical geographic features of the country which give rise to natural disaster producing phenomena, include; the large size—3,020,387 square miles; the great range of latitude, 25° to 49°N latitude—allowing influences of both tropical and Arctic areas; weather and climate, including location in the westerly wind belt with its cyclonic storms; proximity to tropical hurricanes; extensive areas of forests and wild lands; lengthy rivers and coastlines with vast areas of flood plains, delta and coastal plain lands; the predominant low relief of the interior; and the presence of earthquake producing "faults". All parts of this country are subject to one type of natural disaster or another. Of particular importance are: the areas comprising the midwest, the great plains, the south and southeast subject to a variety of natural disasters, but of particular interest are tornadoes and winter storms; the Gulf and Atlantic Coastal areas subject to hurricanes and floods; and the far west with the occurrence of earthquakes of both major and minor importance.

Demographic factors in relation to geography likewise will tend to increase the effects of natural phenomena in causing disaster in the future. With the increasing population and population density through which many areas formerly uninhabited are now the site of houses and factories and wherein formerly the occurrence of natural phenomena would have probably gone unnoticed, now constitute areas where these same phenomena result in disaster under our definition.[21]

SEASON

Seasonal factors also contribute in large measure to the occurrence of both natural and man made disasters. The effects of winter weather on the occurrence of fires and transportation accidents; spring thaws and rains resulting in floods; spring and summer conditions predisposing to tornadoes; late summer and early fall conditions leading to the occurrence of hurricanes. Red Cross experience between 1925 and 1955 indicates

that March, April and September far exceed any other months of the year in the incidence of morbidity and mortality. September has the highest incidence exceeding almost fourfold the other months of the year.[21] Therefore, both geographic location and seasonal distribution provide definite clues to the type and extent of natural disasters that might occur and thereby aid in planning at the local level to meet the disruption incident to their occurrence.

Economic Status

In relating disaster to economic status, it can be safely stated that disaster strikes rich and poor alike. Depending upon the type of event which occurs, however, certain predisposing factors may be operative. Slum areas, for example, are usually fire hazards. When fires occur in these areas, the effects are usually devastating and during the post impact phase may give rise to many problems concerned with rehabilitation that would not necessarily occur in higher economic areas.

Time and Space Considerations

At this point in an epidemiological study it becomes necessary to diverge somewhat from the normal pattern of the study to discuss certain time and spatial relationships which are peculiarly appropriate to a disaster area.

To clarify the sequence of events in the disaster, the time-space model of disasters as promulgated by the Committee on Disaster Studies, National Academy of Sciences of the National Research Council has been employed but modified to meet the purposes of this discussion.[26]

Although each individual disaster is unique in detail, certain time sequence and spatial relationships may be identified as common to all.

Phase 1. *The Steady State* is the normal or usual state of the community prior to the imposition of the disruptive force. Certain factors during this phase will markedly influence the course of events during subsequent phases. These factors are primarily concerned with economic, political, social and religious systems in force; demographic factors; and topography and climate.

Phase 2. *The Warning Stage* may or may not occur. The possibility or probability of the impact of an event in the relatively remote future may or may not be indicated to the population in the impact area.

Phase 3. *The Threat Stage* occurs when the *probability* or *certainty* of specific and local personal danger in the near future is indicated.

Phase 4. *The Impact* or the application of the disruptive force. Death and injury resulting from this event per se constitute the primary effect or the epidemic of trauma. Forces acting subsequent to the impact having implications on the health of the community constitute the threat of disease or secondary effect which has been indicated as the traditional area of community health agency responsibility.

Phase 5. *The Stage of Isolation* is the time between the cessation of the impact and the arrival of aid from outside the impact area. During this period, the victims of primary impact are the only individuals within the impact area. Outside the impact area, under ideal conditions, inventory of the situation and mobilization of efforts are being carried out for relief of the impact area. The time lapse during this phase will be in direct proportion to the preparedness of the community to meet the requirements of disaster. This is considered as one of the critical phases in meeting the challenge of the epidemic of trauma and as will be pointed out later is directly related to the success with which this challenge is met.

Phase 6. *The Stage of Rescue* is that period elapsing between the arrival of aid from outside the impact area until rescue of all victims has been completed. Extrication and evacuation of the injured to appropriate treatment areas and the removal of the dead are the primary objectives during this phase.

Phase 7. *The Rehabilitation Stage* begins upon the removal of the last injured person

from the impact area and may cover an extended period of time. During this phase, further medical treatment and readjustment of medical means are carried out.

Phase 8. *The Stage of Irreversible Change* is the final stage in which a new steady state is reestablished in the community. It has its inception during the rehabilitation stage and may involve days, weeks or even years. Although efforts have usually been directed toward the reestablishment of the previous state of stability, generally speaking, a disaster leaves a legacy of some permanent change.

As with the time phasing there is usually a discernible spatial phasing of the disaster which may be either linear or concentric around the impact area. Linear zones might be characteristic, for example, in a tornado while concentric zones might be characteristic around the impact area which occurs in an explosion. Regardless of the type, however, the area will have certain common spatial subdivisions.

Zone I: *The Total Impact Zone* comprises that area in which the impact agent exerts its total destruction.

Zone II: *The Fringe Impact Area* in which damage is less severe and in which only a few minor cases of trauma may occur. These will comprise casualties who are either capable of seeking necessary aid or providing such aid themselves. (It should be noted that this type of casualty will also be present in Zone I.) Zone I and II comprise the area of the epidemic of trauma.

Zone III: *The Filter Area* is an area which is usually undamaged and from which the mobilized forces mentioned in Phase 6, or Rescue Phase, are located. Additionally, it is in this area that minor emergency medical care should be performed and through which evacuees and rescue workers must pass. Also depending upon the situation, institutions for the provision of definitive medical care may be located in this zone.

Zone IV: *Designated as the Zone of Organized Community Aid* comprises the remaining portion of the community and as with Zone II and III is involved more in the secondary effects of the disaster impact than in the primary effects.

Zone V: *Designated as the Zone of Organized Regional Aid.* This area is located outside of the affected community and is the source of all aid not immediately available therein.

It should be pointed out that there will be wide variations in both time and spatial relationships from one disaster to another and the overlapping which may occur. This will not only be true quantitatively but qualitatively as well. It is important for the proper management of disaster conditions, however, not only in planning but in the execution of plans that time and space factors are considered.

Susceptible Population

The susceptible population in disaster is believed to encompass every individual in every community in the country, be they man, woman or child. No immunity exists. The mere statement of this fact, however, does not portray the entire story. For a proper understanding of the susceptible population it is necessary to study the reactions which have been noted in disasters in the past in order to gain an insight as to what might be expected in the future.

Sudden disaster strikes a community. How do the humans making up that community react to it? According to popular conception, they panic, trampling one another, and losing all sense of concern for their fellow men. After panic has subsided, they turn to looting and exploitation while the community is torn with conflict. Large numbers of people are left permanently mentally deranged; so goes the picture as pointed out by our movies, the press, magazines, books and almost every form of mass communication. This picture is a false one as has been borne out not only by individuals involved but in detailed studies conducted by various research agencies in this field.[16] With every disaster the pattern of behavior has been almost identical. The degree of surprise, the degree of ego involvement, the magnitude of the disaster and many other

factors will tend to modify, prolong, or shorten the phases in this behavior pattern.

Under disaster conditions there exists a psychological pattern different from that prevailing during normal conditions. In general, under extreme stress, behavior is less efficient even in the performance of routine tasks. In some cases it may be so ineffectual as to appear to be pathological. The common denominator of this deteriorization of behavior is its regressive quality; regression to previously learned and less complex ways of doing tasks and of establishing the relations of the individual to his environment.[26]

Among the injured persons in the impact area, a phenomenon labeled the *disaster syndrome* is seen. This syndrome may affect the entire community for a brief period of time even outside the impact area. This syndrome is characterized by the following stages:[26]

"Shock stage" in which the individual is unable to make more than minimal efforts at extrication and aid for himself, his relatives, or his friends. He is apathetic, stunned, and dazed. He is usually unable to estimate the extent or degree of destruction. Unless forcibly directed he will rarely leave the area or seek aid. Frequently he is unaware of his injuries. He normally wanders about aimlessly until guided or directed by someone else.

This is closely followed with the next stage, *"the suggestible stage."* As the individual comes into contact with either rescue persons or persons less affected than himself, he is able under direction to do minimal routine tasks. Extreme concern develops over the welfare of others and the welfare of the community is sought. Marked gratitude may be expressed for minor services and favors.

Possibly a result of a feeling of being spared many victims will develop an *"euphoric state"* after the immediate crisis has passed. At any rate, in this state there is an intense altruism and willingness to work; old grudges may be forgotten; and a strong esprit de corps may be produced.

An *"ambivalent stage"* may follow as the euphoria wears off. Complaints may follow against rescue and relief workers and personal problems come into focus.

Depending upon the psychological makeup of the individual, any, all or none of these phases of the syndrome may be evident. They may cover a space of hours or days or weeks. In general, however, the picture as painted will predominate in a significant number of persons in the impact area.

Likewise there is a very significant emotional reaction among rescue workers, labeled the *"counter-disaster syndrome"* and characterized by an over-eagerness to be of service. This occurs not only with duly authorized personnel but by outsiders and volunteers coming into the area. Blood donors insist on giving their blood; volunteers insist on the right to help; ambulance drivers drive too fast; physicians and hospital workers feel compelled to work fast and under extreme pressure. In many instances the regressive type behavior patterns as seen in the impact area may be observed. Trained physicians under stress may revert to patterns of treatment that under normal conditions they would not consider; such procedures as suturing large contaminated wounds which experience has shown should be left for secondary closure, or even when available they may ignore accepted therapeutic measures such as the administration of whole blood, plasma or plasma expanders.

There are certain socio-cultural patterns which exist during the steady state that are detrimental to the adequate management of disaster conditions.* Our medical profession has a high degree of autonomy; it is based upon the integrity of the patient-doctor relationship; each physician works in his field in a relatively independent fashion caring for his patient from the first visit to the conclusion of his illness or injury. In the application of therapeutic measures, he has wide latitude and only his individual judgment acts as a censor to his actions. He is highly individualistic in his responses and abhors

* Since this paper is primarily concerned with the medical aspects of disaster, only two of the principle factors directly associated with medical service are considered.

any actions which he decries are tainted with the aroma of mental regimentation and the shackling of his individual scientific resources.[7] It is not meant to infer from this picture that such a state is to be condemned. Much of the development in modern medicine has resulted from this philosophy of American medicine. The picture is pointed out only to demonstrate that this philosophy can never meet the requirements of medical care when faced with the conditions existing during an epidemic of trauma.

Likewise in our democracy, based upon individual liberties, authoritative direction and control are decentralized to the smallest social cohesive unit, the local community. Each individual is egocentered and responsible only for his own actions. Interference in the day to day activities of the individual by outside groups or agencies is not well accepted and is considered a violation of their inalienable rights. This concept ascends from the individual through the family, and the social organization in our culture. Under disaster conditions, however, when the course of human events has been suddenly and violently disrupted, with behavior patterns modified, and with social organization and cohesiveness destroyed, such decentralization cannot meet the requirements for coping with the conditions which exist in disaster.

Warnings

Here it might be well to digress a moment from the epidemiological study to discuss the effects of warning. It is an accepted premise that people tend to interpret events in the light of their own experience and understood phenomena. This is the well known human response under almost all conditions. Many examples of this may be cited. Attributing the bombing of Pearl Harbor to Naval gun practice; attributing the Worcester Tornado to a passing train; attributing the entrance of flood waters into a home as being the result of leaving the bath water running; and many others point up this fact.[16] Unless a warning is given such reactions will predominate in the susceptible population. Warnings of themselves, however, if remote will modify the behavior pattern only slightly in that the normal response is "it can't happen to me." Warnings, therefore, of the threat itself in the near future will probably be the only ones that will have the desired effect, and even then the effect of the warning will be less than desirable. Only in instances where the susceptible population has been subjected to repeated threats and subsequent events will there be an approach to efficiency in response. This fact is borne out by the bombing of England and Germany during World War II where behavior patterns were modified only through repetitive threat and event. If a warning is feasible, it should be given even though it may have less than the desired effect. Such warnings should be as specific and clear as possible indicating the area threatened and actions to be taken by the susceptible population. Vague warnings of possible dangers will naturally not be efficacious, and in many instances will precipitate undesirable reactions such as overloading communication systems, ignoring later and more specific warnings, and they may even cause panic such as the effect in New Jersey from the Orson Welles radio show (October 30, 1938). It may be said that in past experience only rarely have the warning systems now in common use functioned to awaken the majority of the target population to imminent and sudden disaster. In certain instances, officials have been notified with inaccurate and incomplete data but in general no successful general alarms have been possible. Thus far to all intents and purposes the majority of disasters will be unaccompanied by any form of warning.

Interpretation and Discussion

With this background for the epidemic of trauma, what can be deduced from the foregoing data.

After the impact in most instances notification of appropriate personnel concerned has been haphazard and usually consider-

able time has elapsed before the magnitude and extent of the disaster had reached responsible officials.

The general pattern of notification of hospitals of impending patient loads has been equally haphazard. The first knowledge by the hospital of a disaster in many cases was the arrival of the first casualty. In general, knowledge by a hospital of the occurrence of disaster has been roughly proportional to the geographic distance the hospital is located with reference to the zone of impact. Word of mouth and passage through the rumor grapevine has been the principal means of communication. The distortion of actual conditions in the impact area can readily be imagined under such conditions. Alerting of appropriate personnel (professional) of a hospital staff is an extremely important factor in the ultimate management of the injured. Therefore efficient and rapid means of accurate communication before, during and immediately after (Warning, Threat and Impact stages) become of primary importance in efficient management.

As was pointed out earlier, the population in general within the impact area are in the various stages of the disaster syndrome and will be able to do little in respect to rescue work except to extricate themselves from the debris and perhaps aid a relative or friend nearby. But to perform any organized, meaningful rescue work cannot be expected. It, therefore, becomes necessary that organized rescue efforts must emanate from the fringe zone and the remainder of the community as soon as possible if damage to life and limb from the event are to be minimized. All agencies of the community will normally participate in this mobilization but the authoritative agencies of the people and the community are those primarily responsible for the organization and direction of this effort. This rescue force will be composed primarily of volunteers from the population converging on the area. This group will be untrained, as a general rule, and inexperienced in rescue operations. They comprise, however, the principal source of assistance and if placed under adequate supervision will accomplish a great deal in the immediate post-impact period. All agencies of the community, not only those concerned with health, are involved—the police, the fire department, utilities and communications agencies—and they must work in coordination under preconceived and coordinated plans.

Injured must be removed and moved to areas for treatment, but not without first having been properly prepared for such movement. The cardinal rules of first aid to stop hemorrhage, prevent shock, immobilize fractures and relieve pain must be carried out before movement and such movement should be made with as little aggravation of the injury as possible. To accomplish this, much will have to be improvised since at this stage little appropriate equipment will be available. Trained physicians are not necessary for this work. The patient loads that will require definitive care in hospitals and improvised hospitals will require all the professionally trained talent available. If distances are great intermediate stops may be necessary for evaluation of the patient, to readjust splints, to combat shock and to arrest hemorrhage. If distances are short, these stops may not be necessary, but in addition to preserving the life of the patient, these intermediate stops will have the additional effect of alleviating the occurrence of overwhelming loads on medical treatment facilities within a short space of time.

Time and space relationships in any disaster will vary in extent and degree with the magnitude of the disaster, but are major considerations in planning and execution of rescue operations. They provide the time and spatial structure within which rescue operations must be accomplished. Since little or no warning may be given and the impact area unknown until the post-impact period, organization of the community in relation to specific zones cannot be accomplished until the immediate post-impact period. Time becomes the crucial element in determining the ultimate outcome or result

of disaster operations insofar as they apply to medical service. The greater the time element involved in initiating and carrying out rescue operations the more adversely affected will be the outcome.

All planning and execution of plans must take into consideration the susceptible population and the patterns of behavior which can be expected. The disaster syndrome must be recognized and looked for just as the prodromal symptoms in an epidemic of disease. Where possible, these action patterns must be directed into constructive channels. The counter disaster syndrome likewise must be anticipated and action taken to prevent or keep to a minimum the regressive behavior which occurs. The disaster committee of the National Academy of Science points out that the best prophylaxis against this sort of stress induced breakdown in relief personnel may be brought about by the actions of a centralized medical authority. One of the principal functions of this central medical authority would be the immediate reduction of anxiety-to-be-of-service by mobilization of personnel to assigned disaster roles and by communication to the individual relief worker the feeling that he is doing a valuable and appreciated job.[26] This point might be further expanded by commenting that the accomplishment of this prophylaxis will be dependent upon the degree to which advance planning has been participated in by personnel concerned in this central medical authority.

The usual socio-cultural pattern in the United States is prejudicial to the conduct of operations essential when disaster strikes. With the minimum of controls and centralized direction which exist in our democratic system the central authority to which a disorganized society would look for guidance and direction is absent. Although self-appointed leadership and sporadic direction on the part of individuals may be effective in isolated instances and in very circumscribed areas, it cannot meet the demands of the situation; such individuals have neither the means at their disposal nor the knowledge of the entire situation to be effective except in a very limited manner.

The concept of medical care in the United States and the guiding philosophy of the medical profession as was outlined previously, likewise, will prejudice the conduct of medical care in the epidemic of trauma. During the Civil War, Jonathan Letterman realized the ineffectiveness of the professional organization of his day to meet the demands of mass casualty care. From the medical point of view, war also may be considered as an epidemic of trauma and Letterman organized a system for the management of this epidemic which in principle is still in operation today within the Armed Forces. The establishment of a chain of evacuation from the site of injury to the place of ultimate definitive treatment with initial first aid at the site of injury and intermediate stops for further evaluation and necessary procedures to conserve life are the basic steps in this philosophy. Continuity of treatment is an essential factor in the operation of the system, but continuity exercised by many medical and auxiliary personnel rather than one. Where many health personnel are involved, continuity of treatment requires standardization of procedures. In contradistinction to the conditions existing under the steady state, when continuity of treatment can be carried out by one physician, disaster will necessitate a series of patient evacuations with a multiplicity of health personnel and a variety of professional competence in the treatment of the injured. Because of these inherent characteristics, the system precludes too great a latitude in individual choice of treatment, lest initial therapy narrow the limits of ultimate definitive care.It is believed that these medical lessons learned by the Armed Forces are freely applicable should civilians rather than the soldiers become victims in the epidemic of trauma.

It is believed that the traditional concept of responsibility in disaster insofar as community health agencies are concerned has

failed to take into account that they are (or should be) concerned with *all* conditions which affect the *health* of the community. This traditional concept of responsibility is exemplified in the report of operations carried out by the health department in the Worcester Tornado.[37]

"It is surprising *how few problems* were presented to the Worcester Department of Public Health by the Tornado of 9 June 1953. The terrifying blow which killed 92, hospitalized thousands, did 70 million dollars in damage and made 15,000 homeless failed to disrupt seriously services under public health supervision." It is difficult to conceive that only a *few problems* could be presented to the health department when 92 persons were killed, thousands were injured, and 15,000 were homeless if the broader concept of community health agency responsibility is accepted. This account does state that "the immediate problem was first aid and medical care of the injured" but does not relate where nor in what manner the health department functioned in this area. The account continues that *"nurses (Health Department) were loaned to the District Nursing Society* (VNA) to help cover home visits for bedside care and the Health Department took over some of the duties formerly carried out by the nonofficial agency." Such cooperation between official and nonofficial agencies no doubt is commendable but it might appear in this instance that the cart was leading the horse.

In another section of this account the author states "However, the cooperation and unselfishness manifested on all sides in this disaster, and the *ability of individuals to meet and solve their own problems* were factors that *minimized the need for service from public health agencies.* As in this statement, throughout the account emphasis has been placed upon the traditional areas of official health agency activity which is undoubtedly of great importance but on the other hand does this concept meet the requirements imposed by the philosophy of public health that "public health is the diagnosis and treatment of the body politic."

It is not meant to infer that the health department of Worcester in any respect should be censured or criticized for its actions during this emergency but only to point out that disaster imposes problems in the health field which cannot be met through the application of the day to day traditional principles of public health practice. Disruption of the normal flow of human events requires dynamic leadership and the health department as the only duly constituted instrument of the people in the health field must provide this leadership in meeting not only the traditional problems *but the additional problems imposed by the disrupting event.*

If one accepts the concept that the community health agency is the only logical one to assume leadership in the health field in disaster, then the local health department becomes the focal point for the organization of *all* community health resources to meet the demands imposed not only on one segment of the population but upon the entire community.

It must logically follow, likewise, that the health department as the focal point in the organization must provide leadership in planning the utilization of community resources for their efficient and maximum effort. Plans must be made in advance to meet the emergency. They must be kept current and all participating agencies must be aware of the part they will play when disaster occurs. Plans must be flexible in order to meet varying conditions and varying situations that might arise. As in the control of any health emergency they must take into account all of the epidemiological factors, previously outlined, if they are to be effective. Plans to meet the epidemic of trauma which occurs are particularly significant. The utilization of physicians and hospitals in past disasters have usually functioned effectively if not efficiently. Most of our hospitals today have emergency plans to cover sudden and heavy influxes of patients[26] but seldom do

any plans exist as to how the injured will reach these hospitals. Therefore, planning must be concerned with this neglected area. Who will collect the injured? How will they be transported? How will they be treated en route? And where will they be taken? All of these questions must be answered in the planning stage. This last area is of specific interest since in past occurrences many hospitals have been overloaded while others have received few if any patients. An organizational element within the total structure must be planned for, one which will be cognizant of available facilities, will prevent the overloading of one installation while another is empty and will be able to direct and control the flow of injured treatment facilities.

If the foregoing discussion is accepted as a basic modus operandi, how and where will the health department function in the execution of the plan when the disaster threatens and strikes? As the authoritative health instrument of the people the health department must primarily be concerned with the direction and control of the overall effort of the community. It must concern itself with alerting and mobilizing the health effort. The situation must be evaluated and specific operations executed. Coordination of health operations within the community health structure for the emergency, the collection of the injured, their evacuation to treatment facilities, identification and disposal of the dead, as well as those traditional healtn operations concerned with the uninjured are areas to be considered by a controlling and directing agency. Coordination of health activities with other community agencies involved in the disaster such as communications, transportation, law enforcement, traffic control and many others; and coordination with health and relief agencies from outside the community will comprise very crucial and important activities that must be carried out. All of these foregoing functions are considered essential if any community emergency, be it a result of natural phenomenon, man made disaster, or a result of war is to be met in an effective as well as efficient manner.

Summary

Through the foregoing discussion, the author has attempted to outline the conditions with which any community might be and can well be faced when disaster in any form may occur. Areas have been pointed out where lack of any organized effort has operated to negate the best efforts of the community. The hypothesis has been established that community health agencies can no longer retain the static concept of traditional public health practice but must assume the role of dynamic leadership in the health field in order that unforeseen events affecting the health of the community can be met and dealt with in a manner consistent with the responsibilities derived from and imposed by the body politic.

Bibliography

[1] Blocker, V. and Blocker, T. G., Jr.: Texas City Disaster, *American Journal of Surgery,* Vol. 78, pp. 756-771, November 1949 (A survey of 3,000 casualties primarily by type of injury.)

[2] Brooks, John.: Five-ten on a Sticky June Day, *The New Yorker,* p. 39 May 28, 1955. (An account of warning and the believed effects of warning prior to the Worcester Tornado.)

[3] Bunker, Ellsworth.: The Voluntary Effort in Disaster Relief, *Annals of the American Academy of Political and Social Science,* Vol. 309, pp. 107-118, January 1957. (Covers Red Cross and other voluntary agency efforts in disasters.)

[4] Burgess, Carter L.: The Armed Forces in Disaster Relief, *ibid.* 3, pp. 71-79. (Basic responsibility civil but military may aid in emergency.)

[5] Burney, L. E.: Public Health Problems in Major Disaster, *ibid.* 3, pp. 80-89. (Covers only the traditional public health activity areas.)

[6] Carr, F. H.: Medico-legal Aspects of the Worcester City Tornado, *New England Journal of Medicine,* Vol. 250, pp. 330-332, February 25, 1954. (Concerns the identification and dispositon of the dead.)

[7] Caseberg, Melvin A.: Handling Mass Casualties, *Journal American Medical Association,* Vol. 154, pp. 550-506, February 6, 1954. (Armed Forces methods in handling casualties.)

[8] Chandler, C. P.: Hospital Plans for Catastrophe, *Bulletin of American College of Surgeons,* Vol. 36, pp. 128-130, June 1951. (Detailed standard operating procedure for hospital operations in emergency.)

[9] Dunlap, George R.: The Worcester Tornado, *American Journal of Surgery,* Vol. 87, pp. 487-488, March 1954. (A narrative account of conditions in Memorial Hospital immediately after the Tornado.)

[10] Drayer, Calvin S.: Psychological Factors and Problems in Disaster, Emergency and Long Term, *ibid.* 3, pp. 151-160. (Adaptation of people to disaster with some discussion as available cushioning procedures.)

[11] Eckert, A. W. and Riddell, D. T.: Disaster Preparation, A Prayer or a Plan, Hospitals, Vol. 25, pp. 41-44, April 1951. (A good checklist for areas to be considered in hospital planning for emergency.)

[12] *Ibid.:* When Disaster Struck We Were Prepared, Hospitals, Vol. 24, pp. 60-64, September 1950.

[13] Enyart, J. L.: The U.S.S. Bennington Disaster, Handling and Treatment (initial) of Casualties, *Armed Forces Medical Journal,* Vol. II, pp. 1481-1488, October 1954. (Discusses initial treatment of burns.)

[14] Faxon, N. W.: The Problem of Hospital Administration in Management of Coconut Grove Burns at Massachusetts General Hospital, *ibid.* 3.

[15] Fritz, Charles E.: Disasters Compared in Six American Communities, *Human Organization,* Vol. 16, pp. 6-10, Summer 1957. (Human perception, reactions and leadership in 1) Airplane accident, Flagler, Colorado, 1951; 2) House explosions, Brighton, N.Y., 1951; 3) West Frankfort, Ill. coal mine explosion, 1951; 4) Three airplane crashes, Elizabeth, N.J., 1951-52-55; 5) Bakersfield, Cal. earthquake, 1952; 6) Tornado, White County, Arkansas, 1952.)

[16] Williams, H. B.: The Human Being in Disasters, A Research Perspective, *ibid.* 3, pp. 42-52. (Discusses reaction patterns to warnings, convergence and other difficulties arising from human behavior in rescue.)

[17] Hays, C.: Program for Medical Preparedness, *Armed Forces Medical Journal,* February 1956. (Military medical preparedness planning.)

[18] Hertell, J. A.: Medical Preparedness for Disaster, *Journal of American Medical Association,* Vol. 106, pp. 1217-1220, March 8, 1958.

[19] Kilpatrick, F. P.: Problems of Perception in Extreme Situations, *Human Organization,* Vol. 16, pp. 20-23, 1957. (Hypotheses from basic research extrapolated to human perceptions under extreme stress, theoretical.)

[20] Leeb, L. D.: Earthquakes. *ibid.* 3, pp. 36-42. (Review of earthquakes, distribution and effects.)

[21] Lemans, H.: Physical Characteristics of Disaster, Historical and Statistical Review, *ibid.* 3, pp. 1-15.

[22] Luehrs, G.: Medical Aspects of a Hurricane in Mexico, *Armed Forces Medical Journal,* March 1956. (Discusses Navy participation in hurricane on the Gulf.)

[23] Lueth, H. C.: Emergency Medical, Hospital and Nursing Services in Disasters, *ibid.* 3, pp. 142-151.

[24] Management of the Coconut Grove Burns at Massachusets General Hospital, Problems in Hospitalization and Administration, Lippincott & Co. New York, 1943.

[25] McGill, W. L.: How a State Prepares for Disaster, *ibid.* 3, pp. 89-98. (Texas plan for disaster.)

[26] Raker, J. W. Wallace, A.F.C., Rayner, J. F.: Committee on Disaster Studies, Emergency Medical Care in Disasters, A Summary of Recorded Experience; Disaster Study No. 6, National Academy of Sciences, National Research Council, Publication No. 457, Washington, D.C. 1956.

[27] Reicheldorfer, F. W.: Hurricanes, Tornadoes and Other Storms, *ibid.* 3, pp. 23-36. (Statistical data in relation to climate and geography.)

[28] Rich, E. R.: Atomic Defense, Lancet, July 24, 1948. (A critical analysis of symposium on isotopes.)

[29] Schneider, D. M.: Typhoons on Yap, *Human Organization,* Vol. 16, pp. 10-15, Summer 1957. (Primitive reactions and behavior patterns on Island of Yap.)

[30] Seckinger, D. L. and Carey, W. H.: Public Health Problems in Civil Defense, Medical Annals of the District of Columbia, May 1951. (Covers problems only in traditional areas of public health practice.)

[31] Smith, DeWitt, Emergency Mass Care, *ibid.* 3, pp. 118-132. (Reviews some disasters and concerned primarily with care of the uninjured, rehabilitation, Red Cross, etc.)

[32] Spiegal, J. P.: The English Flood of 1953, *Human Organization,* Vol. 16, pp. 3-6, Summer 1957. (An account of the flood at Kimbark with observations on behavior patterns and leadership.)

[33] Stiles, W. W.: How a Community Met a Disaster, Yuba City Flood, December 1955, *ibid.* 3, pp. 160-169.

[34] Sturgis, S. D.: Floods, *ibid.* 3, pp. 15-23. (Review of history and statistics referring to floods.)

[35] Williams, H. B.: Some Functions of Communication in Crisis Behavior, *Human Organization,* Vol. 16, pp. 15-19, 1957. (Concerns the "feedback" control system model of communication in relation to behavior patterns in sudden community disaster.)

[36] Wilson, W. L.: Medical Plans for Civil Defense and Disaster Relief, *U.S. Armed Forces Medical Journal,* Vol. I. pp. 462-475, April 1950. (Covers essential planning activities for meeting disaster.)

[37] Witkow, A., and Smith, J. F.: Public Health Aspects of the Worcester Tornado, *American Journal of Public Health,* Vol. 43, pp. 1572-1573, December 1953.

Q-Fever in Turkey

By

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Q-FEVER has been known in Turkey and the area of the Mediterranean Sea for many years. American troops were affected by the disease in Italy during World War II as were German troops in Greece during the same period. The disease has been reported in animals in Turkey and in sporadic human outbreaks from time to time.[1,2] It has also been reported in Russia[3] and the area of the Balkans. In this last case it has been known locally as Balkan Grippe. The disease has also been reported in other areas of this part of the world.[4,5] This is, however, the first time the capillary-tube agglutination test for Q-Fever has ever been used on a large scale in this area. This is the largest testing program ever carried out in Turkey for Q-Fever and was possible only because of the technique used. If the authors had been forced to use the complement fixation test the work would have been impossible.

This represents a cooperative effort between the U. S. Air Force Epidemiological Flight stationed in Izmir, Turkey, and the Turkish Veterinary Research Institute located at nearby Bornova, Turkey. Testing is performed in the laboratory of both institutions. At present the antigen used for the testing is being furnished by Dr. Lauri Luoto of the United States Public Health Service.

The common domestic food animals, wild rats and man residing in Turkey are being tested. From the data collected thus far it has been possible not only to determine the presence of the disease in South Western Turkey, but also to calculate the number of reactors per one hundred specimens tested. A percent of infection has been found for the different species of food animals. Future plans call for more emphasis on the mode of transmission to man and animals.

The sampling points for the domestic animals blood specimens were the municipal slaughter house of the city of Izmir and the Veterinary Research Institute located at Bornova. The municipal slaughter house is a large, modern establishment located outside the city of Izmir. The director of this establishment is a Veterinarian and a former Major in the Turkish Army. Workers on this survey were given carte blanche permission to collect as much blood as desired, and as often as needed. The Veterinary Research Institute, the other source of specimens, is similar to a Brucella control laboratory in the United States. All blood sera tested for Brucella by this institution were offered to the Q-Fever survey project for further Q-Fever testing. These two sources, it is believed, gave us a valid sampling of domestic animals in Southwestern Turkey.

The animal blood specimens were predominately from sheep, but some also from cattle and goats. The sampling approximately followed the percent of these animals in this region of the country. Specimens came from animals raised in the eleven neighboring provinces of Izmir, Turkey. Blood samples from the slaughter house were from animals delivered to Izmir by train, truck and on foot. Flocks of sheep and goats, and herds of cattle, are often driven hundreds of miles to slaughter, which is reminiscent of the early West in the United States. A goal of at least 200 sheep per month was established for Q-Fever testing plus as many other animal specimens as could be collected. After the samples were drawn from each flock or herd, the names of the owner and origins of the animals were recorded. The blood specimens supplied by the Veterinary Research

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Institute were, for the most part, from herds and flocks owned by the State. These animals are being bred in agriculturual experiment stations for the improvement of the livestock industry in Turkey.

Another source of animal blood was wild rat blood from the laboratory of the Epidemiological Flight. The flight maintains a service of rodent monitoring in the city of Izmir. Rats are trapped throughout Izmir and brought to this Air Force Installation alive, where they are examined for ectoparasites, tested serologically for several diseases and given a necropsy examination. One of the serological examinations is for Q-Fever antibodies. As of the present, 86 samples of rat blood have been examined for Q-Fever antibodies.

In addition to Q-Fever in animals there was also an interest in the prevalence of Q-Fever antibodies in man residing in the area. For this part of the survey human blood sera from indigenous personnel was supplied by the American Air Force Medical facilities in Turkey. American personnel were tested only upon the specific request of a military physician. Another sampling of human blood came from volunteers working at the Izmir slaughter house. Many of these people have worked for years in the slaughter house with known Q-Fever and Brucella infected animals. It was thought that they might show evidence of having had the disease. The disease is certainly known as an occupational disease of slaughter house workers.[6,7]

Materials and Methods

The serological test used in this survey was the capillary-tube agglutination test. This is a relatively new technique developed by the United States Public Health Service,[8] using capillary tubes and a stained antigen made from *Coxiella burneti*. This test has many advantages over the complement-fixation test previously used. The complement-fixation technique requires the service of highly trained personnel working with numerous reagents and is not adaptable for use in all laboratories or in the field. The capillary agglutination test for Q-Fever, on the other hand, can be learned in a few minutes and performed easily by semi-skilled technicians. The technique is well suited for field trials conducted away from a central laboratory. The equipment is small, light weight, and can be easily transported. The tests may be incubated at room temperature thus relieving the need for a bacteriological incubator. Complicated pipettes and reagents are unnecessary. Neither does the test require test tubes nor plates. When the test is finished the inexpensive capillary tubes are simply discarded. The test is well suited for small clinical laboratories, field surveys or the office of a practicing physician or veterinarian. The capillary-tube agglutination test has been used successfully in numerous field surveys.[9,10,11]

The antigen used in this survey was supplied by Dr. Lauri Luoto of the United States Public Health Service. It was sent by Air Mail from the Rocky Mountain Laboratory at Hamilton, Montana to the Air Force Fourth Epidemiological Flight located in Izmir, Turkey. Details for the making of this antigen may be obtained from the United States Public Health Service or from appropriate published literature.[8]

The capillary-tube agglutination test is performed in two steps. The first step is called the screening test and is conducted on undiluted serum. Sera which reacts positively to this screening test may be rechecked in a second step for titer. In this survey screening tests were often conducted in the field. Sera which reacted positively to the screening test was brought back to the laboratory where dilutions were made and the sera checked for titer. The actual test is begun by shaking the antigen vigorously to suspend the particulate matter. A drop or two of the antigen is then transferred to the well of a White procelain spot test plate. The capillary tubes used are 9 cm long with an inside diameter of 0.4 mm. Approximately one-third of the tube is filled with antigen and the remainder with serum to be tested. The tubes are inverted (antigen on bottom) and placed upright in clay or

plasticine. The tests on undiluted sera are held at 37°C for two hours or at room temperature for four hours.

In the second step dilution of the sera under test are made with physiological saline solution at 1:4, 1:8, 1:16, 1:32, and 1:64. Each dilution is mixed with antigen in a capillary tube in exactly the same manner as described for the screening test in the preceding paragraph. Tests for titer are incubated at room temperature for a period of approximately twenty-four hours.

A positive reaction, whether for the screening test or the test for titer, is indicated by the formation of blue-black macroscopic agglomerates of *Coxiella burneti* formed in the capillary tubes. A negative reaction is indicated by the absence of such particles.

A distinct advantage of the capillary agglutination test over other tests is that it may be used to test undiluted sera. It has been proven that this test is more sensitive and less likely to produce non-specific reactions than the complement-fixation test.[8,11] Furthermore, studies have shown that undiluted sera in the capillary agglutination test do not produce non-specific reactions but yield results which may be interpreted as indicating either presence or absence of the antibody.

Due to the distance of this operation from America it was not always possible to use the prescribed equipment. Often it was necessary to improvise. The capillary tubes, whose inside diameter is 0.4 mm worked beautifully but the supply was soon exhausted. The only other tubes available for this survey were capillary tubes with an inside diameter of 0.2 mm and three feet long. These tubes were broken into 3" lengths. During the filling of these tubes air bubbles were often trapped in the tubes making it necessary to repeat that operational step. It is suggested, if at all possible, the recommended tubes be used. These can be obtained from the Progressive Laboratory Specialties Corp. 146-16 Hillside Avenue, Jamaica, 35, N.Y.

Epidemiological Findings

Q-Fever antibodies were found in the blood of many of the red meat food animals tested during this survey. The disease which is reflected in antibody production in the animal has been found in all the eleven neighboring provinces of Izmir, Turkey. To this date sixteen hundred and eighty five food animals have been tested in Southwestern Turkey with two hundred and twelve reactors.

In other accounts of the incidence of Q-Fever in domestic animals in Turkey statements have been made concerning infection in different animals. These results (See table 1), indicate some difference between the different species. It is our belief, however, that very little difference in species infectivity actually exists. The percent of positives are probably due to the difference in total number of animals tested and will equal out as more cattle and goats are examined.

It is interesting to note that in a limited side study a comparison was made between the incident of Q-Fever and Bangs disease in a small portion of the test universe. At first 53 animals from three flocks of sheep were

Table 1

Results of Q-Fever Survey of Food Animals in Turkey

This chart gives the total number of test, the species tested and the percent positive. Total positive percent follows closely the percent in each species of animal in Turkey.

Specimen	No. Tested	Screen Pos.	Dil 1–4	Dil 1–8	Dil 1–16	Dil 1–32	Dil 1–64	% Pos.
Sheep	1128	115	14	16	16	14	3	10.1
Cattle	274	41	29	23	1	0	0	14.9
Goats	283	56	0	0	0	0	3	19.7
TOTAL	1685	212	43	39	17	14	6	12.5

chosen at random. All of these sheep were negative for Brucella but two were positive for Q-Fever. Tests were continued for Brucella but the number of positives were few. Cattle were a little more rewarding. Out of a random sample of five herds totalling ninety five animals, nine reactors to Brucella were found and in the same group fifteen reactors to Q-Fever. The opinion at this premature stage is that the incident of Q-Fever in domestic food animals is higher in Turkey than the incident of Brucellosis. It is also the opinion of these workers that some of the abortions in domestic animals are directly caused by *Coxiella burneti,* not *Brucella abortus.* Also, some of the other clinical conditions in animals such as mastitis, lowered milk production, keratitis and conjunctivitis may be due to Q-Fever.[12,13] These findings place a different light on Q-Fever. It has been definitely established that goat milk production is adversely affected by this disease. Goat's milk is important to the economy of Turkey as is cow's milk. Anything affecting this vast source of food is not just a rare disease in man but a disease of everyday practical importance in this part of the world.

Early in this survey it was hoped that a seasonal variation of Q-Fever could be demonstrated. In order to attempt to show seasonal variation a statistic was developed which we called a total percent incident rate. The figure is a simple percent derived by dividing the total number of animals of a given species tested into the number of reactors. Sheep were chosen for this part of the study as these are the most common food animals in Turkey and naturally the largest portion of the survey. We chose to test 200 sheep presented for slaughter every month at the Izmir slaughter house. In the beginning it seemed to be a good idea and differences in rate per month began to appear. The first month, October 1959, the incident rate was 6%. The second month, November 1959, the rate climbed to 10%. In January 1960, the rate jumped to 25%, and finally in February 1960, it fell to 10%. One difficulty was encountered. In March 1960, hardly any sheep were slaughtered and in April even less. We had failed to realize that mutton, like most other food in Turkey, is seasonal, so our monthly random statistical sampling was stalemated. It still seems like a good idea to us and we hope to see the work continue. It is very possible that Q-Fever does show seasonal variation.

To date one hundred and eighty one humans have been tested for the presence of Q-Fever antibodies. One hundred and seventy eight of these people were indigenous foodhandlers and slaughter house employees; the three remaining were American Military personnel. The three Americans tested were a Captain from the U. S. Army, a Major from the U. S. Air Force and an Air Force enlisted man. It is interesting to note that the Army Captain was an infantry soldier in 1943 and one of the many who contracted Q-Fever in Italy during that time.[14] A test of his blood, drawn in November 1959, showed no evidence of his having had an experience with Q-Fever. The Air Force Major and the airman were stationed in Southern Turkey. The Major's blood was Q-Fever positive; the airman's was negative.

The Major had been ill with pneumonia of unknown origin about five weeks before the blood sample was drawn. Although he had recovered from pneumonia he still had recurring fever. He was tested for Brucella, Weil-Felix, Malaria, Tularemia, and heterophile antibody test for infectious mononucleosis and Q-Fever. He reacted positively only to Q-Fever. The reaction was in 1:4 with the capillary-tube agglutination test which is considered specific with this test.[11] Five centimeters of his serum was injected into a guinea pig with negative results. No other Americans in the area were ill with similar disorders. Unfortunately it was not possible to obtain a sample of serum from him before or after his acute illness. He was administered broad spectrum antibiotics during his bout with pneumonia.

Four blood specimens from indigenous personnel in Adana, Turkey, also reacted to Q-Fever. These people worked with the U. S. Air Force Major and lived in the city

of Adana. Unfortunately these people could not be located as it had been weeks from the time the samples were drawn and time the Q-Fever tests were performed. Sera from these people were also injected into guinea pigs without production of positive Q-Fever results.

The forty seven employees of the local slaughter house, where many of the infected animals were slaughtered, all reacted negative to Q-Fever. The question arose as to whether these people had ever had Q-Fever. They were personnel from all parts of the plant. Many of these people have worked for over thirty years in this plant with highly infective animals. Perhaps some of these people have contacted Q-Fever as the Army Captain did and have recovered without leaving a lasting titer or perhaps they are still susceptible. From an epidemiological standpoint this would be an interesting place to perform a Q-Fever skin sensitivity test. Some reports indicate that the sensitivity test is positive before and long after agglutin antibodies have disappeared for the body.[15] If these people have not had Q-Fever it is possible that some day in the future the Izmir slaughter house may experience an epidemic of Q-Fever, similar to the one which occurred in Texas in 1946.[7,8] In many ways the conditions in the two slaughter houses are similar.

The eighty six rats tested during this period were all negative for Q-Fever antibodies. This was unexpected as many of these animals live in fairly close contact with food animals. Izmir, unlike most Western cities, still uses a great deal of animal power. It is hoped to extend this study and later trap rats at the farms where high Q-Fever in domestic animals is known.

Summary

The capillary agglutination test for Q-Fever was used in all serological analysis performed. This relatively new technique is ideal. Using this technique it is possible to diagnose Q-Fever in the field. No longer is it necessary to transport samples great distances for a complicated complement-fixation test. The test can be performed by most laboratory technicians in a few minutes. Results are satisfactory when the test is performed either at room temperature or at 37°C.

The first objective of this study was to determine if Q-Fever existed in Southwestern Turkey. The answer to this question was affirmative. Up until the present time sixteen hundred and eighty five food animals have been tested plus eighty six wild rats and one hundred and eighty one human beings. Two hundred and twelve of the food animals were found to possess agglutins in their blood for Q-Fever. The rats were all negative. It appears from this study that Q-Fever is more common in Turkish food animals than Brucellosis. It is the opinion of some Greek and Turkish workers that Q-Fever is capable of producing clinical symptoms in the animal host as well as in man.

Q-Fever has been reported as a sporadic epidemic in both the civilian and military population in the Eastern Mediterranean in the past. It is a disease of definite military importance. This study revealed one American military case and evidence of past infection in four indigenous civilians employed by the American Military Forces. Blood tests of forty seven slaughter house workers indicated no agglutins present for Q-Fever. This is puzzling as many of these people had been employed by the Municipal slaughter house for many years and were accustomed to handling highly infected Q-Fever animals. Perhaps these men have had Q-Fever or perhaps they may experience an explosive outbreak someday similar to the epidemic which occurred among slaughter house workers in Amarillo, Texas during the month of March, 1946.

References

[1] Payzin, Sabahattin: La Q-Fever en Turquie, Archieves de I' Institute Pasteur du Marco T. IV, Cahier, Pages 13-18, 1949.

[2] Alpar, S., and Massie, E. L.: Turkiyede Q-Hummasi, Turke Veteriner Hekimleri Dernegi Dergisi, 30:746-755, 1960.

[3] Rostivtsevac: Control of Q-Fever, USSR, Journal of the American Veterinary Medical Association, 130:105-105, 1957.

[4] Ehrlich, C.: Q-Fever in West Germany, Journal of the American Veterinary Medical Association, 134:234-234, 1959.

[5] Golem, Said B.: Hayvan Q-Hummasi Hakkinda, Turkish Veterinarian Society Monthly Magazine, Sayi 55-56, pages 65-70, April-May 1951.

[6] Topping, N. H.; Sheppard, C. C. and Irons, J. V.: Q-Fever in United States, Journal of the American Medical Association, 133:813-815, 1947.

[7] Irons, J. V.; Murphy, J. N.; Rich, A. B.; and Hill, A. E.: Q-Fever survey in Southwest Texas, American Journal of Public Health, 39:485-491, 1949.

[8] Luoto, Lauri: A Capillary Agglutination Test for Bovine Q-Fever, Journal of Immunology, Vol. 71, No. 4:226-231, 1953.

[9] Reed, Charles and Wentworth, Beltina: Q-Fever Studies in Ohio, Journal of the American Veterinary Medical Association, 130:458-461, 1947.

[10] Tjalma, Richard A., and Braun, John L.: Application of the Luoto Capillary Agglutination Milk Test to the Study of Bovine Q-Fever, American Journal of Public Health, Vol. 49, No. 8, pages 1025-1031, 1959.

[11] Luoto, Lauri: A Capillary-Tube Test for Antibody against *Coxiella burneti* in Human, Guinea Pig, and Sheep sera, The Journal of Immunology, Vol. 77, No. 5: pages 294-297, 1956.

[12] Atilla, Cavid: Deviation Yolu Ile Turkiye Hayvanlarinda, Q-Hummansi Bakimindan Yapilan Arastirmalar, V. Inci Turk Mikrobiyoloji Kongresi, 26-27-29, 36-59, Eylul 1952.

[13] Golem, Said B.: Hayvan Q-Hummasi Hakkinda, Turkish Veterinarian Society Monthly Magazine, Sayi 55-56, pages 65-70, April-May 1951.

[14] Feinstein, M.; Yesner, R. and Marks: Epidemic of Q-Fever among troops returning from Italy in Spring of 1945, American Journal of Hygiene, 44:72-87, 1946.

[15] Onul, Beh Ic: Q-Hummansinin Deri Testi Ile Teshisi, V. inci Turk Mikrobiyoloji Kongresi, 26-27-29, pages 66-73, Eylul 1952.

ARMED FORCES RADIOBIOLOGY RESEARCH INSTITUTE

(See Cover)

The first pulse-type reactor designed exclusively for biomedical research is being constructed by the Department of Defense at the National Naval Medical Center, Bethesda, Maryland. The $4.4 million installation named the Armed Forces Radiobiology Research Institute (AFRRI) will be built around the DASA-TRIGA Mark F. Reactor.*

The Defense Atomic Support Agency is sponsoring the Institute which will be used by the Medical Services of the Army, Navy, Air Force and other Federal agencies such as the National Institutes of Health and the Atomic Energy Commission. Qualified civilian institutions may also use the facility on a scheduled basis.

The reactor will have sufficient versatility, power and neutron flux for full scale research in many fields, including the study of radiation effects on living organisms, therapeutic use and as a potential source for producing extremely short-lived radioactive isotopes.

The DASA-TRIGA reactor will operate at a steady state power level of 100 kilowatts (thermal) and at 1000 kilowatts for periods up to ten minutes at a time. It can be pulsed for split-second periods to a peak power level in the range of 1500 kilowatts, providing intense but self-limiting pulses of neutron and gamma radiation.

There is a unique safety factor of vital importance in the family of TRIGA-reactors, a fuel moderator, uranium-zirconium hydride, which provides the reactor with a large negative temperature coefficient (built in thermostat). This promotes an immediate and automatic shutdown or return to normal operating power levels even if the maximum excess of reactivity is suddenly inserted. The prototype reactor has already been pulsed safely more than two hundred times at peak power levels.

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Anterior Tibial Compartment Syndrome: A Plea for Early Surgical Treatment*

By

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ISCHEMIC necrosis of isolated groups of muscles is most common to those of the anterior tibial compartment. These changes have been referred to as anterior tibial syndrome, anterior crural ischemia, traumatic necrosis of the pretibial muscles, Volkmann's ischemic contracture of the leg, march gangrene, and by other descriptive phrases.

Authors[1-4] credit different individuals, but apparently the first cases of this syndrome were reported in 1943. Reports have since appeared in the American, British, Scandinavian, German and Italian literature but these changes must occur with more frequency than the literature indicates. Possibly many cases are unrecognized in the acute phase or are diagnosed late as some form of paralysis.

Blandy and Fuller[4] report a similar syndrome of the peroneal muscle compartment with treatment and return of normal function. A review of the reported cases of anterior tibial syndrome shows that full recovery has been rare. It is the purpose of this paper to review the literature, report three cases with the anterior tibial and peroneal compartment ischemia, two with complete recovery, and to stress the early surgical treatment of these conditions.

ETIOLOGY

The symptom complex leading to gangrene can be initiated in several ways.[5-14] Moretz[3] very sensibly divided the cases in the literature into groups according to factors initiating the chain of events which resulted in ischemic changes.

Group I. Strenuous muscle activity: Unaccustomed activity such as marching, hiking, jumping or participating in athletics results in the anterior tibial compartment syndrome.

Group II. Trauma from external violence: Direct trauma, fracture of the tibia and fibula or soft tissue injury by compression may result in ischemic necrosis of isolated groups of muscles.

Group III. Interference with the main arterial supply: A decrease in blood flow into the compartment from spasm, embolus, thrombus or other vascular lesions may cause ischemic muscle changes.

Among the specific mechanisms credited with initiating the syndrome are, functional impairment of the anterior tibial artery as it enters the compartment over the interosseous membrane,[15] arterial spasm[16] and vascular inadequacy from other causes. Muscle swelling from the accumulation of lactic acid and metabolites with hemorrhage or extravasation of fluid into the compartment[4,17] and rupture of muscle fibers with hemorrhage and edema[18,19] have been implicated. We have observed anterior tibial compartment swelling develop spontaneously in a patient on anticoagulant treatment.

PATHOLOGICAL PROCESS

While one or more factors may initiate the changes which result in ischemic necrosis, most authors agree that the anatomical arrangement of the rigid osteofascial compartment plays a major part in the development of irreversible changes of the anterior tibial compartment contents.

With prolonged or unusual exercise there is an excessive accumulation of metabolites or production of an abnormal product. With

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activity, muscle may increase its weight 20 per cent by retention of tissue fluid.[20] Swelling occurs and venous return is impeded, further increasing capillary exudation. Hughes[16] has suggested that the accumulation of lactic acid and waste products may change the hydrogen ion concentration resulting in some segmental arterial spasm. Nevertheless, a relative anoxia develops. This is compounded by the swelling in a rigid, closed space such as the anterior tibial compartment. Other muscle groups, as the peroneal muscles, are vulnerable but the anterior tibial muscles are more frequently involved probably because of the tight compartment and the part played by these muscles in marching, hiking and athletics. Apparently, the liability of certain muscles to ischemia also is related to their intramuscular vascular pattern as shown by Edwards' excellent study.[21]

The final stage of the pathological process varies with the degree of ischemia, the time elapsed and type of treatment instituted. With early treatment, minimal changes may result. With delayed treatment, muscle breakdown and secondary infection may occur with loss of the entire anterior tibial compartment contents. Other cases progress to various degrees of fibrosis of the muscles.

Histology

The histological changes vary according to the time at which the biopsy is taken. Bowden and Gutmann[22] described three types of changes occurring in muscle following vascular injury in man: (1) massive necrosis; (2) diffuse interstitial fibrosis; and (3) scattered foci of necrosis and fibrosis mixed. Some authors describe the histological changes occurring in the compression myopathy of the anterior tibial syndrome as identical with those seen in Volkmann's ischemic contracture.[16, 19, 23, 24]

Signs and Symptoms

The patient gives a history of unusual or sustained physical activity. Early, pain is noted in the anterior compartment muscles and the area becomes tender. Pain is elicited on flexion or extension of the ankle. Swelling occurs with bulging of the muscles anterolaterally to the tibia. Induration follows with painful limitation of motion of the ankle. With progression of the swelling, paralysis of the muscles occurs and the skin over the compartment may become anesthetic. More constant is the presence of anesthesia of the interdigital cleft between the first and second toes. The time of onset of paralysis is variable. The pedal pulses rarely are affected although they may be decreased or absent. Later the area over the anterior leg may show redness and increased warmth. This varies from hours to days depending on the severity of the swelling and is one reason this condition has been confused with inflammatory diseases and thrombophlebitis.

In late cases the muscles may remain firm with limited ankle motion, pain on walking and anesthesia between the first and second toes. Foot drop is a common complication, the degree varying with the extent of fibrosis and contracture of the muscles which may limit the foot drop.

Differential Diagnosis

The clinical picture usually is sufficiently characteristic to permit an accurate diagnosis. The history of sustained or unusual physical activity such as marching, hiking, running or participating in athletics, is common in the patient with the anterior tibial syndrome. If the patient is known to have had direct trauma, compression or interruption to the major arterial supply proximally, this also may be helpful in making the diagnosis. Otherwise, such conditions as cellulitis, deep abscess, tenosynovitis, thrombophlebitis, acute osteomyelitis and peroneal nerve lesions must be differentiated. Thromboangitis obliterans, myositis, pretibial fever and fractures have been confused with the syndrome. An early and accurate diagnosis is necessary to arrest the irreversible changes. Failure to recognize this condition has resulted in treatment by antibiotics, nitroglycerine, sympa-

thetic blocks, elastic bandages, aspiration and incision and drainage.

Treatment

Since this syndrome is seen most commonly in the young athlete or serviceman following sustained or unusual exercise, then primary prevention begins with a program of progressive systematic training and awareness of this condition. Athletes walk off their discomfort. Prompt recognition and proper treatment are necessary to prevent prolonged disability. Since signs and symptoms continue to progress after cessation of activities, bed rest and elevation of the extremity under careful observation is important. Continued progression of swelling or suggestion of ischemic neuropathy as indicated by hypesthesia in the first interdigital cleft is an indication for surgical intervention. It is difficult to determine when weakness of dorsiflexion of the foot is neurological because the motion may be limited by the pain produced or mechanically by the swelling of the muscles.

Proper surgical intervention consists of relieving the tension in the anterior compartment by an adequate fasciotomy, preferably under spinal anesthesia. This involves a long skin incision over the anterolateral portion of the leg with incision of underlying fascia. Both structures should be incised superiorly and inferiorly until a gloved finger can be passed under the fascia freely without a feeling of tightness. The wound is left unsutured and dressed with a fine mesh dry gauze. This allows later inspection and debridement of the muscles if necessary. Delayed primary closure is rarely possible and skin graft usually will be required. If desired, the patient may be given antibiotics since some muscle necrosis is common.

Some authors[17,25] warn against late fasciotomy for fear that irreversible changes in muscle has taken place and fasciotomy will result in secondary infection. They contend that without surgical intervention, fibrosis of the muscles may occur with some contracture and support of the drop foot. However, one cannot place a time limit in hours as to when a fasciotomy should or should not be done. Full recovery has been reported following fasciotomy after 30 hours.[4] Furthermore, if the muscles are necrotic, the compartment contents should be evacuated. Tendon transplants can be performed at a later date to help support the foot drop.

Complications and Their Prevention

The major complication resulting from ischemia of an isolated group of muscles is gangrene and necrosis of those muscles. Such necrosis may be life-endangering in the patient who has been in shock and developed post-traumatic renal insufficiency.[26,27] This latter complication would not be expected in the usual patient with the anterior tibial syndrome.

The amount of ischemic change may range from minimal necrosis to complete liquefaction of the muscles involved. All muscles within the compartment are not always equally involved. Incision of the compartment after muscle necrosis has begun can result in secondary infection and necessitate removal of all muscles from the compartment. Varying degrees of foot drop occur depending on the severity of the ischemia. In those patients with incomplete necrosis, the involved muscles are partially replaced with fibrous tissue so that the muscles remain hard, become contracted and may result in some dorsiflexion of the foot. Pain is another late complication of this symptom complex.

Case Reports

Anterior Tibial Syndrome

Case 1: A 24-year-old airman was admitted to the hospital three hours after onset of tenderness in the anterior compartment of his left leg which occurred while he was marching on asphalt pavement. He had noted discomfort in the leg while bowling the previous evening. On admission the patient's temperature was 99.4 degrees Fahrenheit, the anterior tibial compartment was swollen and tender with dilatation of super-

ficial veins. Pedal pulses were normal and sensation was grossly intact. He was treated with bed rest and elevation of the extremity. The swelling became more pronounced and first interdigital space anesthesia developed. Twelve hours after admission, swelling continued and weakness of dorsiflexion of the foot became evident. Fourteen hours after admission, under spinal anesthesia, an extensive fasciotomy of the anterior tibial compartment was done. Bluish discolored muscules bulged from the compartment and in a short time regained their color and appeared viable. A biopsy was taken and a fine mesh dry gauze dressing was applied. The following day the pain was lessened and the patient regained some motion of the foot but the anesthesia remained. Progress continued but on the third postoperative day the patient developed an inguinal adenopathy. By the seventh postoperative day, some areas of muscle necrosis were noted in the upper portion of the tibialis anterior. These areas were replaced by granulation tissue. The wound was covered by a split skin graft 13 days after fasciotomy. Progress was uneventful and after wound healing and physical therapy, the patient made a complete recovery and was returned to duty 70 days after initial onset. The biopsy showed striated muscle bundles separated from each other by edema.

Case 2: A 24-year-old soldier was admitted to the hospital six days after onset of pain in both anterior tibial regions. The pain began during a rest period while on a field problem. Walking accentuated the pain. He reported to his dispensary where he was treated with elastic bandages and bed rest. The pain in the right leg subsided within one day. The pain in the left leg continued with increased severity.

On physical examination the patient's temperature was 100 degrees Fahrenheit and pulse, 82. The left leg was 1 centimeter larger than the right with diffuse redness, tenderness, swelling and heat over the left anterior tibial compartment. The patient was unable to dorsiflex his foot and he was insensitive to pinprick between the first and second toes.

A fasciotomy of the anterior tibial compartment was performed along with muscle biopsy. The muscle bulged from the compartment, appeared ischemic and lifeless and did not bleed on biopsy. Microscopically, the biopsy revealed muscle necrosis. He was placed on antibiotics and sterile technique employed in every way. Areas of muscle necrosis became evident but granulation tissue formed. Eighteen days later the area was successfully covered by a split thickness skin graft. The posterior splint used to support the foot drop was removed and physical therapy begun. The patient then was fitted with a short leg, drop-foot brace and allowed full ambulation. At that time he was regaining some dorsiflexion.

Six weeks after the fasciotomy he was returned to duty with limitations. Three months after his surgery, the patient was pain free and gradually increasing the extent of dorsiflexion. The anterior compartment muscles were hard and some loss of sensation over the great toe persisted.

Peroneal Compartment Syndrome

Case 3: A 28-year-old Marine was admitted to the hospital, stating he had noted pain and swelling in his right leg for 20 hours which began after a lengthy march. His temperature was 100 degrees Fahrenheit. He had edema of the foot, a swollen, tender right leg with mottling over the peroneal area and numbness over the lateral foot. Pedal pulses were normal. Two hours after admission, 22 hours after onset, under spinal anesthesia, a lateral skin incision was made so that both the peroneal and anterior tibial compartments could be visualized. The peroneal compartment was stony hard and bulging. Upon incising the fascia of the peroneal compartment, there was marked bulging of the musculature and major portions of the peroneus longus and brevis were ischemic. Following fasciotomy there was some return of circulation to those muscles. The fascia of the anterior tibial compart-

ment also was opened but the muscles appeared uninvolved. The skin incision gaped approximately four inches. A fine mesh dry gauze dressing was applied. On the tenth and again on the 24th postoperative days, debridement of the necrotic areas of the peroneal muscles was done and 35 days after fasciotomy, a split skin graft was applied. Under physical therapy, the patient regained excellent function and was returned to light duty 101 days after admission. Microscopically, the excised muscle showed loss of the cross striations and nuclear detail with fragmentation in numerous areas.

Discussion

Bowden and Gutmann[22] point out that the ischemia may result from wounds of a major vessel or muscle branches, from closed injury with vessel damage, emboli or thrombi, or from accumulation of fluid and swelling in rigid compartments. The literature lists ischemia as secondary to fractures, direct missile injury, periarteritis nodosa, arterial injury, emboli and thrombi. Other cases have been reported as resulting from a twisted ankle, tight leg strapping, infusion of blood and repair of a fascial defect for a muscle hernia.[28] Although the muscle changes in many of these individuals may be identical to those with the anterior tibial syndrome, the causative agent may be different.

It has been shown that the pathological changes encountered in Volkmann's ischemic contracture, muscle ischemia from arterial wounds and the anterior tibial syndrome often are identical. Bywaters[26] noted similar changes in patients with compression myopathy following crush injuries. It would appear that the contractures encountered early in any of these conditions may be an initial reversible stage of Volkmann's contracture which if undisturbed might result in a typical Volkmann's contracture or the late stage of the anterior tibial syndrome.

The anterior tibial syndrome is found primarily in the young male following prolonged or excessive physical activity. The average age of the patient with this syndrome is the mid-twenties. Ischemia of isolated groups of muscles may occur in individuals of all ages, but a specific causative agent more often is identified in the older patients.

Many of us as youngsters have experienced spasm of the gastrocnemius muscle during exercise. This is thought to be the result of an accumulation of metabolites. Athletes recognize a condition of stiff, painful muscles following unaccustomed exercise which they call "shin splints"[18,19] and which they walk off by gradual exercise. Body builders also recognize "muscle binding."[4] All of these conditions may be related with a critical point beyond which irreversible damage occurs.

Many theories have been offered as to the progress of events which results in ischemia of isolated muscle groups following excessive exercise. This condition, while usually unilateral, may be bilateral. Some authors have suggested that arterial occlusion or spasm may be responsible but the distal pulses usually are palpable and Carter[19] demonstrated patent arteries by arteriography with oscillometric readings increased in some.

Apparently, prolonged or unusual activity produces an excessive accumulation of metabolites. The increase in muscle bulk secondary to the activity hinders proper removal of these metabolic products further increasing capillary leakage. A relative anoxia develops which is compounded by the swelling of the muscles in the rigid osteofascial space of the anterior tibial compartment. Unless treatment is instituted a cycle develops which may result in irreversible muscle changes. This theory also has been expressed by others.[29]

This progression of events is similar to that observed in isolated groups of muscles following an overt vascular lesion. This is not a new phenomenon. It was recognized during World War II during the bombing of Britain[26] and on the battlefield[30] in upper and lower extremities. It was noted again during the Korean War.[31] DeBakey and

Simeone[30] reported that ischemic contractures in these patients sometimes occurred within 12 hours, especially after popliteal artery wounds and reached a maximum in 36 to 48 hours.

We have observed this phenomenon several times. It begins in the ischemic limb with fasciculation and gradually involves all muscles and compartments. The muscles become hard and fixed in ischemic contracture. After arterial repair or return of circulation, the muscles gradually relax but often begin to swell. In some cases the swelling is insignificant and soon subsides. In others the swelling becomes severe to the degree that those muscles in tight compartments often are damaged irreversibly.

The pathological process in the patient with temporary occlusion of a major vessel is visualized as a progression of events similar to that following excessive exercise. With occlusion of a critical major artery, the ischemic but viable muscle, unable to rid itself of its metabolites, becomes contracted and firm. Following return of blood supply to the muscle, the waste products are carried away but the previously anoxic capillaries lose fluid into the tissues, creating interstitial edema. With the increased swelling and venous obstruction, more swelling occurs and a cycle develops that can lead to irreversible muscle changes especially in tight compartments as the anterior tibial and flexor compartment of the forearm. A fasciotomy may be required for protection of these muscles following vascular reconstruction. The severity of swelling varies with the period and degree of anoxia. Some muscles exhibit limited swelling then soften, others develop some degree of irreversibility before the blood supply is returned. Other compartmental muscles of the extremities may undergo similar changes. It was noted in one study of the muscles of the leg that the soleus is more vulnerable to such changes than is the gastrocnemius.[32]

Regardless of the initiating agents; whether it be functional, from interference with the main arterial supply or from direct trauma; early recognition and treatment of ischemia to isolated groups of muscles are important to prevent permanent crippling. The involved muscle groups in patients with major arterial involvement may be irreversibly damaged before arterial repair is performed. The same is true of the patient with crush or direct trauma to muscle groups. It is the young, healthy individual who develops the anterior tibial syndrome that offers the best prognosis with proper treatment. Proper treatment means awareness of this syndrome, early recognition, and early conservative care under careful observation. Irreversible changes may occur during the observation period since the swelling frequently continues to progress at bed rest. Such patients become surgical emergencies and any suggestion of excessive swelling or of compression neuropathy is an indication for an extensive fasciotomy.

Summary

1. Ischemic necrosis of isolated groups of muscles may result from traumatic swelling within tight fascial compartments or from direct interferences with the main arterial supply.

2. Ischemic changes may take place in various muscle compartments but such changes are most commonly seen in the anterior tibial compartment.

3. The most common cause of the anterior tibial compartment syndrome is excessive, prolonged or unaccustomed exercise.

4. Because of failure to recognize this syndrome, results of treatment have been poor with complete recovery rarely achieved.

5. The importance of early surgical intervention to prevent permanent disability is emphasized.

6. In addition, three cases with anterior tibial and peroneal compartment ischemia are reported with complete recovery of two of the patients.

References

[1] Psaki, R. C.; Schields, C. D.: Ischemic Necrosis of the Anterior Tibial Muscles. Arch. Phys. Med. 33: 153-155, March, 1952.

[2] Watson, D. C.: Anterior Tibial Syndrome following Arterial Embolism. Brit. Med. J. 1:1412-1414, June 11, 1955.

[3] Moretz, W. H.: The Anterior Compartment (Anterior Tibial) Ischemia Syndrome. Ann. Surg. 19:728-749, Aug., 1953.

[4] Blandy, J. P.; Fuller, R.: March Gangrene. J. Bone & Joint Surg. 39B: 679-693, Nov., 1957.

[5] Sirbu, A. B.; Murphy, M. J.; White, A. S.: Soft Tissue Complications of Fractures of the Leg. Calif. & West. Med. 60:53, 1944.

[6] Child, C. G.: Non-infective Gangrene following Fractures of the Lower Leg. Ann. Surg. 116:721, 1942.

[7] Harrison, R.; Jackson, P. E.: Anterior Tibial Syndrome after Acute Arterial Occlusion: Treated by Decompression. Brit. Med. J. 2:403, 1956.

[8] Horn, E. C.: Acute Ischemia of the Anterior Tibial Muscles and the Long Extensor Muscles of the Toes. J. Bone & Joint Surg. 27:615, 1945.

[9] Horn, J. S.; Sevewt, S.: Ischaemic Necrosis and Regeneration of the Tibialis Anterior Muscle after Rupture of the Popliteal Artery. J. Bone & Joint Surg. 33B:348, 1951.

[10] Jones, S. G.; Cotton, F. J.: Ischemic Paralysis of Leg Simulating Volkmann's Contracture. J. Bone & Joint Surg. 17:659, 1935.

[11] Jones, T. I.: Anterior Tibial Muscle Compartment Claudication with Incomplete Arterial Occlusion. Ann. Surg. 150:257, Aug., 1959.

[12] Mavor, G. E.: The Anterior Tibial Syndrome. J. Bone & Joint Surg. 30B:513, May, 1956.

[13] Tillotson, J. F.; Coventry, M. B.: Spontaneous Ischemic Necrosis of the Anterior Tibial Muscles. Proc. Mayo Clin. 25: 223, 1950.

[14] Campbell, R. E.: Necrosis of the Anterior Tibial Compartment Musculature. Med. Bull. U. S. Army, Europe 12:18, Jan., 1955.

[15] Phalen, G. S.: Ischemic Necrosis of the Anterior Crural Muscles. Ann. Surg. 127:112-120, Jan., 1948.

[16] Hughes, J. R.: Necrosis of the Anterior Tibial Muscles due to Fatigue. J. Bone & Joint Surg. 30B:581-594, Nov., 1948.

[17] Kunkel, M. G.; Lynn, R. B.: Anterior Tibial Compartment Syndrome. Canad. J. Surg. 1:212-217, April, 1958.

[18] Pearson, C.; Adams, R. D.; Denny-Brown, D.: Traumatic Necrosis of Pretibial Muscles. New Eng. J. Med. 239:213-227, Aug. 5, 1948.

[19] Carter, A. B.; Richards, R. L.; Zachary, R. B.: The Anterior Tibial Syndrome. Lancet 2: 928-934, Nov. 19, 1949.

[20] Wright, S.: Applied Physiology. Oxford University Press, New York, 1937.

[21] Edwards, E. A.: The Anatomic Basis for Ischemia Localized to Certain Muscles of the Lower Limb. Surg. Gynec. & Obst. 97: 87-94, July, 1953.

[22] Bowden, R. E. M.; Gutmann, E.: The Fate of Voluntary Muscle after Vascular Injury in Man. J. Bone & Joint Surg. 31B:356-368, Aug., 1949.

[23] Blum, L.: The Clinical Entity of Anterior Crural Ischemia. AMA Arch. Surg. 74:69-64, Jan., 1957.

[24] Caldwell, R. K.: Ischemic Necrosis of the Anterior Tibial Muscle: Case Report with Autopsy Findings and Review of the Literature. Ann. Int. Med. 46:1191-1199, June, 1957.

[25] Campbell, R. E.; Van Wagoner, F. H.: Ischemic Necrosis of the Anterior Tibial Compartment Musculature. AMA Arch. Surg. 71:662-668, 1955.

[26] Bywaters, E. G. L.: Ischemic Muscle Necrosis. J.A.M.A. 124:1103-1109, April 15, 1944.

[27] Meroney, W. H.: Uremia-like Symptoms not due to Uremia in Battle Casualties. J.A.M.A. 158: 1513-1516, Aug., 1955.

[28] Parvin, R. W., Personal Communication, 1959.

[29] Grunwald, A.; Silberman, Z.: Anterior Tibial Syndrome. J.A.M.A. 171:2210-2213, Dec. 19, 1959.

[30] Surgery in World War II, Vascular Surgery, Office of The Surgeon General, Dept. of the Army, U. S. Govt. Printing Office, Washington, D.C., 1955.

[31] Hughes, C. W.: Acute Vascular Trauma in Korean War Casualties. Surg. Gynec. & Obst. 99: 91-100, July, 1954.

[32] Scully, R. E.; Hughes, C. W.: The Pathology of Ischemia of Skeletal Muscle in Man. Am. J. Path. 32:805-829, 1956.

A Clinical Note on the Use of Dexamethasone in the Study of Patients Suspected of Hypopituitarism

By
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ALTHOUGH not a frequent clinical problem, adenohypophyseal insufficiency is seen or considered in the differential diagnosis sufficiently often to be of interest to physicians of all medical persuasions. The rapid advance of clinical knowledge has removed responsibility for the care of these patients from the endocrinologist and placed it with the profession in general.

When hypopituitarism is seen in the larger medical facilities, under optimum conditions, the diagnosis is reached quickly and simply. Extenuating circumstances, however, do arise which complicate management of such diagnostic steps in a brief period; dependents or retired personnel frequently present themselves at clinics some distance from home; the consultant sees patients who have had or must have minor surgical procedures. In these situations one wishes to make the diagnosis while maintaining the patient in a state most likely to insure health.

The purpose of this communication is to point out the usefulness of dexamethasone*** as supportive therapy during study of patients who are strongly suspected of hypopituitarism.

A.C., a 20 year old male, was admitted to the U. S. Naval Hospital, Oakland, California with a history of abdominal pain, weakness, decreasing visual acuity and increased water intake and large volumes of urine. On physical examination he had normal vital signs and was confused and lethargic. His body habitus was eunuchoid and his body hair distribution feminine. He was first seen after sudden hypotension during preparation for pneumoencephalography. Pending further endocrine evaluation, the patient was maintained on dexamethasone 0.5 milligrams at 8 a.m. and 8 p.m. After 14 days of dexamethasone the urinary 17 hydroxycorticoids were 10.4 milligrams per 24 hours, a normal value. The protein bound iodine was 6.6 micrograms per cent. The clinical impression was diabetes insipidis with loss of gonadotropic activity only. At autopsy a pinealoma was found.

G.R.M. was seen with a history of loss of vision with documented bitemporal hemianopsia. A chromophobe adenoma of the pituitary was decompressed without further loss of sight. The patient was maintained on thyroid and cortisone replacement therapy for a period in excess of 2 years. The laboratory documentation of absence of urinary gonadotropic activity and of hypothyroidism was satisfactory, but the adrenal status was never clear. While in the hospital for treatment of a duodenal ulcer, on no adrenal steroid therapy, the patient excreted 8.3, 9.4, and 9.3 milligrams of 17 hydroxycorticoids daily. These compounds were found in 31 milligram amounts after administration of 40 units of adrenocorticotropin daily, intravenously, for five days. When sent home on no adrenal replacement the patient lost appetite, vigor and weight. He became extremely anxious. Since his home was some distance from the hospital, evaluation of the urinary corticoids was repeated during the administration of 0.5 milligrams of dexamethasone at 8 a.m. and 8 p.m. The corticoid excretion values were again normal. Subsequently, hypoadrenalism has ensued, evidently as a result of continued growth of the chromophobe adenoma.

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*** 9-alpha-fluoro, 16 hydroxy prednisolone supplied generously as Decadron® by Merck Sharp & Dohme Research Laboratories and as Deronil® by the Schering Corporation.

L.A., a dependent wife, was evaluated approximately one month after hypophysectomy for metastatic carcinoma of the breast. Prior to discharge from the hospital, endocrine evaluation was desired physiologically to assess the degree of hypophyseal ablation. While taking 20 milligrams of hydrocortisone daily, the urinary 17-hydroxycorticoids were 7.2 milligrams per 24 hours. After four days on a regimen of dexamethasone 0.75 milligrams at breakfast and dinner-time, the urinary 17-hydroxycorticoids were 2.4 milligrams daily, a value consistent with hypopituitarism. Gonadotropin and thyroid function studies were also in the hypofunction range.

In the three examples cited above, the use of maintenance therapy with dexamethasone facilitated appraisal of the patients adrenal function without peril to the individual. Where clinical hypoadrenalism existed, this therapy corrected the deficit.

Certain theoretical considerations are pertinent. In the hypoadrenal patient, the contribution of small doses of dexamethasone to measured urinary adrenal steroids is negligible. As was seen in L.A., the use of hydrocortisone was associated with urinary Porter-Silber chromogens well within the range of normal but derived from exogenous drug rather than the adrenal. 9-alpha-fluoro hydrocortisone in even smaller doses than dexamethasone may be given, but quantities sufficient to supply glucocorticoid needs lead to excessive sodium retention and, in time, hypertension.[1]

It might be feared that dexamethasone would depress the adrenocorticotropin elaboration of the normal pituitary.[2] In small dosage of the order of 0.5-0.75 milligrams orally at 8 a.m. an 8 p.m. daily, we have not depressed the urinary steroid values to the range of hypofunction. Spacing of the administration of the drug is important if pituitary depression is to be avoided. We have followed the suggestion of Forsham[3] in giving at least one-half of the total daily dose at 7-8 a.m.

The use of dexamethasone in this dose range in our practice for nearly two years has not been associated with complication during or after therapy. However, a word of caution is in order regarding those patients in whom continued glucocorticoid therapy is unnecessary. Although we have observed normal urinary 17-hydroxycorticoids in the urine of patients treated for two weeks in the manner suggested here, we have no data as to the ability of the patient to increase adrenal activity in response to injury. The problem of the "steroid withdrawal syndrome" has been discussed recently by Bondy.[4] In the absence of a clear understanding of the mechanisms involved in steroid withdrawal, one must carefully observe the patient after withdrawal of dexamethasone.

Summary

It has been suggested that patients in whom failure of the anterior pituitary is strongly suspected, and in whom extenuating clinical or social circumstances dictate adrenal glucocorticoid replacement, be managed by the oral administration of 0.5 to 0.75 milligrams of dexamethasone at 8 a.m. and 8 p.m. This dosage of dexamethasone does not significantly increase the urinary steroid values in the hypoadrenal patient. When given in the morning and evening, the diurnal variations in cortocotropin secretion of the normal pituitary are considered in an effort to avoid depression of a possible normal pituitary-adrenal axis.

References

[1] Boland, E. W.: Experiences with 9-alpha fluorohydrocortisone in rheumatoid arthritis. *Ann. New York Acad. Sc. 61*:591 (May 27) 1955.

[2] Black, R. L.; Reefe, W. E.; David, J. R.; Bloch, Kurt J.; Ehrlich, G. E., and Bunim, Jos. J.: Dexamethasone: antirheumatic properties, hormonal effects and adverse reactions (a 16 month study). *Arth. & Rheum. 3*:112 (April) 1960.

[3] Di Raimondo, V. C. and Forsham, P. H.: Some clinical implications of the spontaneous diurnal variations in adrenal cortical secretory activity. *Am. J. Med. 21*:321 (Sept.) 1956.

[4] Amatruda, T. T.; Hollingsworth, D. R.; D'Esopo, N. D.; Upton, G. U., and Bondy, P. K.: Study of the mechanism of the steroid withdrawal syndrome. *J.C.E. 20*:339 (March) 1960.

Some Aspects of Physiology Training in Naval Aviation*

By
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OVER 20 years have elapsed since special training was first instituted in the United States Navy to familiarize aviation personnel with the use of oxygen equipment and the physiology of altitude. The training provided has been useful to the operational forces and has undoubtedly resulted in the saving of a number of lives and considerable expensive naval equipment. The progress of this training program through the World War II years, its subsequent collapse during demobilization, and its slow but steady revitalization through the intervening years to the present time is a matter of historical importance. With the routine operational use of aircraft above 50,000 feet and the trend towards orbital flight, aviation physiology has become an integral part of operational training essential for the safety of flight.

PREWAR AND WORLD WAR II

In recognition of physiological problems arising from the operational use of aircraft capable of sustained flight at altitudes above 10,000 feet, instruction of aviation personnel in the use of oxygen equipment and familiarization with the physiology of altitude is reported by Carson[1] to have begun in the United States Navy prior to the outbreak of World War II. A course of instruction in these subjects was decided upon and initiated, part of the course being conducted within a low pressure chamber. The first four low pressure chambers were installed at the basic flight training schools at Pensacola, Jacksonville, Miami, and Corpus Christi.

This training was reported by Gates[2] to have been made available initially at Pensacola to cadets, officer student pilots, enlisted student pilots, Royal Air Force and Royal Navy personnel. In lesser numbers officers and men from the Free Gunnery School at Pensacola were trained. Training was subsequently given to medical officers enrolled in the Flight Surgeon's and Aviation Medical Examiner's courses. In addition, in 1942 ten medical officers from various naval air stations were trained at Pensacola as instructors to inaugurate low pressure chamber training at their respective permanent duty stations. Also, H-V(S) officers were trained as instructors. The physical plant at Pensacola was enlarged by the addition of two new low pressure chambers. These became operational in late 1942 and early 1943 respectively. The number of students reported in 1942 by Gemmill[3] as having been indoctrinated at Pensacola was 2,521.

By 1943 training and indoctrination in aviation physiology had developed[4] under the cognizance of the Bureau of Aeronautics with the cooperation of the Bureau of Medicine and Surgery to an extent that it was being carried out at 12 naval air stations. Medical officers, physiologists, and enlisted technicians were using a prescribed syllabus consisting of lectures in physics of the atmosphere, physiology of respiration and function, use and maintenance of oxygen breathing equipment. Demonstrations of the total effects of lowered barometric pressure were given in low pressure chambers. Many of the stations had been provided with permanently installed low pressure chambers for use in this program.

In April 1943 the general cognizance for this training became a responsibility of the Division of Aviation Medicine of the Bureau of Medicine and Surgery. The program had

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The opinions and assertions expressed in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the Department of the Navy or the naval service at large.

*From the Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D.C.

developed beyond the experimental stage and had become an accepted administrative function requiring increased numbers of medical department personnel for its operation and a central point for the promulgation of instructions to officers-in-charge of the individual training units.

The Bureau of Medicine and Surgery established a Low Pressure Chamber and Oxygen Section under its Division of Aviation Medicine in June 1943 and subsequently administered the development of training techniques, the conduct of high altitude training for the training commands and the fleet, and provided trained instructors and supervisory personnel. The conduct of the training at the local level was placed under the direct supervision of the local senior medical officer. Assistance was obtained from locally assigned junior flight surgeons.

In August 1943 the Vice Chief of Naval Operations published a directive regulating high altitude oxygen training. The mission of the training was stated[5] to be: indoctrination in the effects of high altitude operations; instruction in the use and maintenance of oxygen equipment; and elimination of the physically unfit from high altitude flying.

The proper use of the eyes during night flying operations was appreciated and training procedures were instituted. The Naval Aviation Night Vision Instructor's Manual (NAVMED-296) was published. This publication reflected the training material developed by the Royal Canadian Air Force Biophysics Laboratory, McGill University, Montreal through the courtesy of Squadron Leader K. A. Evelyn. Night Vision for Airmen was published in August 1944 by the Office of the Chief of Naval Operations (OPNAV 33-NY-13 . . . NAVAER 00-80T-17).

Ten Years Following Demobilization

Immediately following World War II aviation physiology training collapsed due to the release of trained instructors from active duty. The low pressure chambers and other training equipment rapidly fell into disrepair. Regardless of the demoralizing effect on the naval service of the rapid demobilization, progress in the science of aeronautics leading to the development of higher performance aircraft continued. The necessity for training in aviation physiology was inseparably bound to this progress in aeronautics. It could be abandoned only for an interval.

Jet aircraft were developed and improved. The first Navy jet landed and took off on an aircraft carrier, the USS F. D. ROOSEVELT, on 21 July 1945. As evidence that the bioscientists were progressing along with the aeronautical engineers, the initial efforts to construct a full pressure suit which would protect the pilot from the effects of very high altitude began in 1946. Attained altitudes and speeds of aircraft were being constantly extended. In 1947 an aircraft first exceeded the speed of sound. In 1948 the first jet squadron qualified aboard an aircraft carrier, the USS SAIPAN.

Until the establishment of the Allied Science Branch of the Medical Service Corps in 1948 there was no established career pattern in the Navy to attract aviation physiologists. Flight surgeons attempted to conduct aviation physiology training but there were an insufficient number of them to adequately perform the training. Attempts to attract physiologists had been unsuccessful. The unavailability of instructors was an important factor in the slow revitalization of training.

In October of 1948 there was no over-all integrated aviation physiology training program in effect such as was conducted in World War II. The low pressure chambers in operation were at the Naval Air Station, Jacksonville; the Naval Air Station, Pensacola; and the Naval Air Station, San Diego with intermittent training being given at the low pressure chamber at the Naval Air Station, Norfolk. However, at this time several officers who had participated in the program during World War II were induced to return to active duty in the Medical Service Corps[5] and revitalization of this training began.

Several aspects of aviation physiology

training were discussed as an agenda item of the annual Naval Air Training Command Conference in 1948,[6] and a general strengthening of the training was recommended including the addition of regularly scheduled refresher training for fleet pilots.

The appearance in increasing numbers in the postwar fleet of high performance-high altitude aircraft focused renewed attention on the danger of the lack of oxygen on flight personnel and on the cause, symptoms, dangers, and prevention of that condition. As a result, it was determined by the Bureau of Aeronautics that thorough training in the use of oxygen was essential for flying personnel. A training program in three phases was directed.[7] These phases applied to students undergoing flight training in the Naval Air Training Command, the Naval Air Reserve Training Command, and to pilots in the fleet and certain shore activities where flight personnel were assigned missions necessitating the use of supplementary oxygen. The publication of this directive served to renew interest in training and resulted in an inspection of the existing low pressure chambers by the Special Devices Center. The chambers were placed in operable condition and recruiting efforts were begun for instructor personnel to reinstitute training.

The first naval mobile ejection seat trainer was completed and placed in operation in 1949. Ten additional similar trainers were distributed. The Chief of Naval Operations' Flight Safety Council expressed a requirement at this time that all aircraft pilots operating airplanes with ejection seats should be given a complete indoctrination in the operation of the seat on a trainer.

Additional emphasis was placed on the program by the Chief of Naval Operations with the publication of an instruction[8] on 8 May 1953 which defined the scope of oxygen training in naval aviation and specified the minimum personnel qualifications for performing oxygen flights. It was stated that the omission and misuse of oxygen equipment can and does hamper operations and has resulted in the loss of crews and valuable aircraft. Cognizant commands were directed to issue the necessary instructions to further implement the program and to integrate it with other training requirements of the Navy. In addition, the assignment of an oxygen officer was directed at the operating unit level and the unit training officer was designated to arrange for the training of appropriate personnel in a low pressure chamber.

In 1954 the Night Vision Instructor's Manual (NAVMED P-5006) was published under the auspices of the Bureau of Medicine and Surgery and distributed to training activities. The use of two dimensional and three dimensional trainers in this phase of training was increased.

The recruiting of aviation physiologists was greatly assisted by the amendment of Section 204 of the Career Compensation Act of 1949 which authorized hazardous duty incentive pay for the performance of duty as a low pressure chamber inside observer and for duty as a human acceleration or deceleration experimental subject. This authorization for officers and for enlisted technicians became effective in the Navy on 1 April 1955. This act was subsequently amended in 1957 to permit the payment of hazardous duty incentive pay for duty as a human test subject in thermal stress experiments.

Revitalization Progresses

On 27 September 1955 the Chief of Naval Operations published a revised directive[9] which further strengthened the training program. This directive stated that the program would consist of definitive instruction in aviation physiology, oxygen breathing equipment, cabin pressurization, personal airborne protective equipment, night vision, and the use of the ejection seat. It directed that the program would include a comprehensive series of lectures involving theoretical and practical aspects of the material presented including actual runs in the low pressure chamber, ejection seat trainer, and night vision trainers. It specified that training would be provided in the following subjects:

hygiene of flying personnel, sensory illusions of flight, physiological effects of high intensity noise, anti-exposure suits, acceleration effects in anti-g suit, protective helmet, restraining devices, parachutes and harnesses, escape hatches, flotation gear, Dilbert Dunker, ditching procedures, survival equipment, omni-environmental suit, escape capsule, and new protective and safety equipment as developed. It stated that a thorough knowledge of aviation physiology and proficiency in the use of personal protective equipment is a prerequisite to safety of flight and success of a military mission. It further stated that since the requirements must be related to the nature of the mission and the type of aircraft flown, the contents of the syllabi should be varied according to local fleet requirements. The objective of the program was stated as being to train flying personnel so that they would be prepared in every respect to cope with hazardous flight which may be encountered.

Under the stimulation of this directive, training was expanded by increasing both the number of locations offering the training and the number of instructor personnel assigned. The Chief of Naval Operations further assisted by authorizing five additional officer billets to augment the program.

By 1955 progress in the development of the Navy full pressure suit, begun in 1946, led to the requirement to provide training for fleet aviators in the physiological principles and use of the suit. The Chief of Naval Operations authorized the establishment of this training at the Naval Air Station, Norfolk, Virginia and the Naval Air Station, San Diego, California as an addition to the existing aviation physiology instruction. Each of these locations was provided an additional aviation physiologist, two enlisted technicians and two parachute riggers as instructors. The services of the parachute riggers were required for the individual fitting of the suit to the wearer. A six weeks' course of instruction was instituted for these instructor personnel at the Aviation Medicine Equipment Laboratory, Philadelphia where the suit was under development.

It was reported[10] that in the fiscal year ending in June 1956 11,585 individuals were trained on low pressure chamber flights to a simulated altitude of 43,000 feet and 10,271 to an altitude of 30,000 feet; 12,833 were trained in night vision using the three-dimensional night vision trainer; and 9,438 received ejection seat trainer shots. The following increases in training over the preceding fiscal years were reported: 26 percent in low pressure chamber flights, 50 percent in oxygen physiology lectures, 14 percent in three-dimensional night vision training, and 54 percent in ejection seat trainer shots.

Present Program and Trends

On 25 February 1959 the Chief of Naval Operations republished the 1955 directive[11] with an added requirement that civilian passengers, foreign nationals and other occupants of high performance aircraft require adequate indoctrination in aviation physiology prior to flight in such aircraft and further defined additional specific conditions under which training was required.

Three new 100,000 foot low pressure chambers were delivered in 1960 by the contractor for permanent installation at the Marine Corps Air Station, El Toro, California; the Naval Air Station, Cecil Field, Florida; and the Marine Corps Air Station, Beaufort, South Carolina. New training buildings were provided at two of these locations to receive the low pressure chambers. At the Marine Corps Air Station, El Toro, the low pressure chamber was installed in an existing training building.

The complexity of the training environment increased with the introduction of various models of ejection seats into naval aircraft. These were the Martin Baker ejection seat installed in both the training aircraft version and the fleet or full pressure suit version; the North American seat in the training aircraft version in the T2J and the fleet or full pressure suit version in the A3J; and the Douglas RAPEC seat in A4D pro-

duction prior to October 1959. Ejection seat trainers were developed for procedural training in the Martin Baker seat in both the training aircraft version and the fleet or full pressure suit version. North American type ejection seat trainers simulating the A3J seat were constructed. A new ejection seat trainer cartridge, designated the Mark II Mod I, was developed and distributed. This cartridge was equally suitable for use in the newly developed and the existing trainers.

Due to the increasing complexity of escape problems in naval aircraft, it became necessary in Fiscal Year 1960 to set up a study to determine the optimal design of training devices and doctrine. This study was intended to provide advice as to the degree of simulation permissible in seat trainers, the optimum frequency of firing on the trainer subsequent to indoctrination, the degree of use of the communication system and other systems of the full pressure suit during the training experience and other related problems. In performing the study it was recommended that seat installations of all currently used and prospective types of aircraft be analyzed and that advice be obtained from contractor's test personnel, the Naval Aviation Safety Center, staffs of Type Commanders, the Naval Air Training Command, and the several squadrons operating these aircraft. The performance of this study was undertaken by the Naval Training Device Center.

Aviation physiology training is currently provided at the following locations: Naval School of Aviation Medicine, Pensacola, Florida; Naval Air Station, Alameda, California; Naval Air Station, Barbers Point, Hawaii; Naval Air Station, Corpus Christi, Texas; Naval Air Station, Jacksonville, Florida; Naval Air Station, Norfolk, Virginia; Naval Air Station, Olathe, Kansas; Naval Air Station, Quonset Point, Rhode Island; Naval Air Station, North Island, San Diego, California; Naval Missile Center, Point Mugu, California; Aviation Medical Acceleration Laboratory, Johnsville, Pennsylvania; Naval Air Test Center, Patuxent River, Maryland; Marine Corps Air Station, Cherry Point, North Carolina; Marine Corps Air Station, El Toro, California; and Marine Corps Air Station, Beaufort, South Carolina. A portion of the training is available at the Naval Air Station, Key West, Florida. Approval has been obtained to establish this training at the Naval Air Station, Whidbey Island, Oak Harbor, Washington and the Naval Air Station, Cecil Field, Florida.

In addition to aviation physiology training, special indoctrination in the physiological principles involved and the use of the Navy full pressure suit is available at the Naval Air Station, Norfolk, Virginia; the Naval Air Station, North Island, San Diego, California; and the Naval School of Aviation Medicine, Pensacola, Florida. Portions of the full pressure suit training are available at the Naval Missile Center, Point Mugu, California; Marine Corps Air Station, El Toro, California; and Marine Corps Air Station, Beaufort, South Carolina.

Close liaison is maintained with the training of the Project Mercury Astronauts through representatives of the Space Task Group of the National Aeronautics and Space Administration, Langley Field, Virginia. The full pressure suit training instructors are qualified and equipped to assist in training future astronauts in aspects of orbital or space flight.

A tabulation of the number of individuals trained in recent years in representative subjects is provided in Table 1.

A cooperative arrangement between the United States Navy and the United States Air Force is in effect whereby aviation personnel of either service may be trained at the nearest location to their duty station at which training is provided regardless of the service to which they belong. For example, the Navy provides training for both services in the Hawaiian area at the Naval Air Station, Barbers Point, and the Air Force provides training for both services in the Western Pacific area at Okinawa. The training provided by each service is comparable and

TABLE 1

TABULATION OF NUMBER OF INDIVIDUALS TRAINED IN REPRESENTATIVE SUBJECTS

Subject	1957*	1958*	1959*
Altitude lecture and LPC** training	9,139	9,949	10,764
Pressure breathing lecture and LPC** training	17,900	14,560	12,664
Oxygen mask and equipment fittings	20,950	20,485	19,799
Night vision training	14,538	11,628	11,581
Ejection seat procedure	12,104	12,620	13,512
Pressure suit fitting and explosive decompression demonstration	170	223	346

* Calendar years.
** Low pressure chamber.

close liaison between the two training programs is maintained by representatives in their respective departmental offices in Washington, D.C.

Courses of instruction to provide instructor personnel in aviation physiology have been conducted at the Naval School of Aviation Medicine, Pensacola since early in World War II. In 1957 the syllabus for this course of instruction was revised to comprise a total number of 368 hours of instruction given over a period of 10 weeks leading to the designation Applied Aviation Physiologist. The number of officers graduating from this course was as follows: Fiscal Year 1957, 4; Fiscal Year 1958, 3; Fiscal Year 1959, 3; Fiscal Year 1960, 6. One additional Naval Reserve officer was trained in Fiscal Year 1960 for a Government contractor.

In order to provide a background of information useful to the Cadet as he advances into aviation physiology training, a basic course in human physiology consisting of 15 hours of instruction is provided at Pensacola for Naval Aviation Cadets. This instruction is given by a physiologist in the Preflight School.

There are 21 authorized officer billets for aviation physiologists as instructors in aviation physiology training. In addition, there are billets in research, development, testing, and evaluation available to officers with the necessary educational background and aptitude. Interchange between these types of duty assignments provides a stimulating career for the physiologist which may be sufficiently varied to satisfy the particular interests and aptitudes of the individual.

For officer instructors a minimum educational background is considered to be 30 semester hours of graduate work in physiology or a related subject. A sufficient number of instructors is not always available who possess this background and several instructors do not meet this standard. There are, however, five instructors who hold a doctorate degree and eight instructors who hold a master's degree. Of the latter number, three are enrolled in doctorate training, two of whom expect to qualify in 1961. Of the instructors with less than a master's degree, four are actively engaged in postgraduate work.

On 4 May 1959 the Surgeon General announced the establishment of a course of instruction at the Naval School of Aviation Medicine, Pensacola for low pressure chamber technicians. This course consisted of 119 hours of didactic instruction and 121 hours of practical instruction. It included theory and practice in low pressure chamber operation and maintenance, use of personal protective equipment, use of full pressure suits and ejection seat trainers, study of the various systems used to obtain pressurization in naval aircraft, the hazards of rapid decompression, and lectures and demonstrations on oxygen equipment. Lectures were also required on vertigo, hyperventilation, dysbarism and the effects of accelerative forces. Graduates qualify for the designation NEC 8409, Low Pressure Chamber Technician. In Fiscal Year 1960, 33 men were graduated from this course. In addition, 8 field-trained men were given this designation. Prior to this time enlisted technicians were obtained from graduates of the Aviation Medicine Technician's Course and were field-trained in low pressure chamber operation.

Summary

The development of training in high altitude physiology in naval aviation is briefly traced from its beginning prior to World War II until 1 July 1960. This includes a record of its extensive growth during World War II, subsequent collapse during the period of postwar demobilization, and slow but steady regrowth to its present form. The introduction of generations of progressively higher performance aircraft in the postwar years necessitated revitalization of this training program and modification of its content to serve operational needs. Extension of the training is shown into such related fields as the use of full pressure suits and other personal equipment items which are transitional in nature leading into physiological training for orbital and space flight.

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References

[1] Carson, L. D.: Indoctrination of flying personnel in physiologic effects of high altitude flying and need for and use of oxygen. J. Aviat. Med. 142, 13:162-169.

[2] Gates, D. C.: Low pressure chamber activities; oxygen indoctrination unit. Contact, Pensacola, 1942, 2:87-89.

[3] Gemmill, C. L.: Indoctrination of aviation personnel in use of oxygen equipment in a low pressure chamber. Nav. Med. Bull., Wash., 1942, 40: 576-579.

[4] Cognizance and direction of program for indoctrination of flying personnel in the physiological effects of altitude and use of oxygen equipment. Navy Department, Bureau of Aeronautics letter Aer-F-30-AB P11-1/F49-1, April 8, 1943.

[5] High altitude indoctrination training program. Navy Department, Memorandum for Vice Chief of Naval Operations, serial 446P542, 25 October 1948.

[6] Agenda Item No. 24—Oxygen Training. Report of Sub-Committee No. 4. Naval Aviation Training Conference held 29 January 1948.

[7] Oxygen training program. Navy Department, Bureau of Aeronautics Aviation Circular Letter No. 34-49, 23 March 1949.

[8] Aviation oxygen training qualifications. Department of the Navy, Office of the Chief of Naval Operations, OpNav Instruction 3740.3, 28 May 1953.

[9] Aviation physiology training program. Department of the Navy, Office of the Chief of Naval Operations, OpNav Instruction 3740.3A, 27 September 1955.

[10] Plaudits for Aviation Physiology Training Units. Department of the Navy, Bureau of Medicine and Surgery, BuMed News Letter, Vol. 28, No. 4, pp. 39-40, 24 August 1956.

[11] Aviation physiology training/indoctrination. Department of the Navy, Office of the Chief of Naval Operations, OpNav Instruction 3740.3B, 25 February 1959.

The Coryzal Syndrome–Effective Management

By
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UPPER respiratory infections account for a large share of absenteeism prevalent in civilian and military establishments during late fall and throughout the winter. The common cold, influenza, and other types of acute respiratory disease comprise some 90% of all respiratory ills.[1] The coryzal syndrome which accompanies these infections is local and systemic in character. Local manifestations of rhinitis, lacrimation, and pharyngitis make the patient very uncomfortable. The systemic picture of headache, arthralgia, myalgia, and fever augment the local symptoms sufficiently to make the individual cease functioning as a member of a team essential in civilian or military effort.

It has been demonstrated that indiscriminate use of antibiotics in the management of patients with such complaints is frequently ineffective and may actually be dangerous.[1,2] Toxic reactions, superinfections, anaphylactoid responses, and the emergence of resistant strains of organisms are only a few of the problems which may be encountered.

Numerous anti-coryzal preparations are available for temporary relief of the syndrome. However, when one particular preparation shows promise of effecting tremendous relief and an aid to speedy recovery, it deserves special mention. Such a product was recently made available for study.

THE THERAPEUTIC AGENT

The liquid preparation under investigation, PFZ-169, contains three essential ingredients aimed at the alleviation of the local and systemic symptoms which accompany upper respiratory infections. Each teaspoonful of the preparation contains *Choline salicylate* 870.0 mgm., *Phenylephrine hydrochloride* 5.0 mgm., and *Chlorpheniramine maleate* 2.0 mgm.

Chlorpheniramine maleate is a proven parasympatholytic drug[3] which produces vasoconstriction of the nasal mucosa, reduces rhinorrhea, generally increases resistance of mucosa to infection by its anti-histaminic action, and provides relief from the allergenic components of etiologic agents associated with upper respiratory disease. *Phenylephrine hydrochloride* is a well-known sympathomimetic amine known for its effectiveness[4] in providing potent vasoconstriction of nasal mucosa, reduces the possibility of side effects encountered with epinephrine such as tachycardia or arrhythmia, and lessens production of tissue edema. *Choline salicylate* is an effective analgesic, antipyretic, and anti-inflammatory agent.[5,6,7]

It acts more rapidly than aspirin, producing initial blood level peaks of salicylate within 10-12 minutes after administration. Effective blood levels of salicylate are maintained for at least 6 hours following a single dose thus providing constant therapeutic blood concentrations during a usual divided-dosage regimen.

Choline salicylate reduces the incidence of gastrointestinal intolerance which often accompanies therapy with other salicylates. The author has had occasion to use this salicylate with good results in an anti-arthritic preparation[8] and in a better-than-average gargle.[9] As with other salicylates, overdosage may result in signs of salicylism. *Phenylephrine* should be used with caution in hypertensive states. *Chlorpheniramine* may on occasion produce drowsiness, restlessness, or dryness of the mouth.

CLINICAL FINDINGS

Fifty-six adults who agreed to coöperate in the study were chosen at random. They ranged in age from 17 to 76 and consisted of 21 males and 35 females. By sheer coincidence a well-balanced age grouping resulted: 7 patients fell into age group 17-20; 7 in age group 21-30; 14 in age group 31-40; 13 in age group 41-50; 7 in age group

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51-60; and 8 in age group 61-76.

Principal presenting complaints included rhinitis, pharyngitis, sinusitis, pleuritis, tracheitis, bronchitis, tracheo-bronchitis, and laryngitis. The interval between onset of PFZ-169 therapy and onset of symptoms ranged from 12 hours to 11 days; the usual period was an elapsed time of 3-4 days. In one instance a patient reported an existing pleuritis of some 8-10 weeks duration prior to therapy; in another instance, onset of symptoms could not be determined with any degree of accuracy.

Dosage employed ranged from one to two teaspoonfuls every 3 hours during waking hours and was maintained from 2 to 5 days; the average patient needing no more than three days therapy.

Results

Of the 56 patients, all but two yielded results which could be termed good to excellent. One patient, recently completing a series of shock treatments, and another with a history of occasional bouts of asthma were considered as failures when objective findings did not demonstrate improvement. All 56 were afforded symptomatic relief which they personally deemed most satisfactory.

One individual experienced a minimal epistaxis, rapidly relieved by the application of a cold compress to the bridge of the nose. Two individuals did not particularly savour the taste of the liquid.

Concurrent therapy in most instances included measures for relief of cough and maintenance of general health. Twenty-one patients received an antibiotic because of a high fever or the presence of a deep-seated infection.

Discussion

When a preparation designed for treatment of the coryzal syndrome can substantially demonstrate an improvement in subjective and objective manifestations, it deserves some attention. Any medicament which affords some measure of relief to the long-suffering patient with a respiratory infection to the degree noted here merits further evaluation. Of 56 patients studied, 54 or 96%, were grateful for the relief obtained with the preparation evaluated.

Conclusion

A new preparation, PFZ-169, containing three pharmacologically active ingredients *Chlorpheniramine maleate, Phenylephrine hydrochloride,* and *Choline salicylate* was evaluated in 56 patients presenting signs and symptoms commonly associated with coryza. The preparation was aimed at alleviating subjective and objective manifestations of upper respiratory infections. It afforded a large measure of relief for such cases. The new medication is a welcome adjunct to the professional armamentarium and deserves further full scale evaluation and usage.

Acknowledgement

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References

[1] Long, P. H.: The Common Cold in *Conn's Current Therapy,* W. B. Saunders Co., Philadelphia. p. 8 (1956).

[2] Jordan, W. S.: The Common Cold in *Conn's Current Therapy,* W. B. Saunders Co., Philadelphia, p. 7 (1959).

[3] Osol, A., and Farrar, G. E.: *U. S. Dispensatory,* 25th Ed., J. B. Lippincott Co., p. 303 (1955).

[4] *Ibid:* p. 1048.

[5] Wolf, J., and Aboody, R.: Studies on the Rate of Absorption of the Choline Salt of Salicylic Acid, Federation Proc. 18:605 (1959).

[6] Broh-Kahn, R. H.: Pharmacologic and Clinical Studies with Choline Salicylate, Federation Proc. 18:17 (1959).

[7] Scully, F. J., and Broh-Kahn, R. H.: Pharmacologic and Clinical Investigation of Choline Salicylate, presented as a Scientific Exhibit at the Southern Medical Association, Atlanta, Ga., Nov. 16 (1959).

[8] *"Arthropan"* (an Exhibit by Davis, G. M., et al.): The Use of Choline Salicylate in Rheumatic Fever and Rheumatoid Arthritis. Scientific Exhibit at Interstate Postgraduate Medical Association of North America, Chicago, Ill., November 2-5 (1959).

[9] "Pharycidin"

EDITORIALS

Food and Disaster

RECENTLY a Member of Congress made this ridiculous statement: "We should be considering ways to feed the two thirds of humanity who go to bed hungry every night rather than telling Americans to store away a two-week supply of food in useless holes in the ground."

Undoubtedly this Member of Congress keeps a supply of food on hand in his pantry. He certainly is forward looking enough to prepare for the days ahead. If he is not we question the reputed wisdom of this member of such an important body of our government.

A two-week supply of food kept on hand whether in a hole in the ground or in the pantry on the floor of the house does make sense.

Could any city provide food for its population if someone had not the foresight to maintain supplies? What is wrong with a two-week supply of staple foods in one's pantry?

Emergencies are always occurring—floods, hurricanes, tornadoes, fires—to name a few. We recall that a few years ago in Washington the Potomac River was frozen over—an unusual condition to be sure. The oil supply tanks of many homes were empty. Some had not made wise provision for keeping these tanks sufficiently filled with oil to provide for just such an emergency that occurred.

It will be more than an inconvenience if our bodies do not get the fuel that is required in time of emergency. Food supplies should be maintained in each home. And a two-week supply in each home is evidence of wisdom. There is nothing wrong with being ready for emergencies. Imagine the cursing of the authorities by certain people who may not have heeded the many warnings to be ready for a disaster, those who had not provided a supply of food, and may not have provided for shelter of an emergency nature!

We do agree, however, with the esteemed gentleman of our Congress on one point. Ways and means should be studied constantly for increasing the production of food in foreign lands. Let us also add, ways and means should be found for the distribution of that food once it is produced. The food should find its way into the bellies of the poor as well as the wealthy. Even in our America there is need to develop methods for the distribution of the surplus to many who are in want. We all know that all stomachs are not filled even in this land of plenty.

Yes, it is wisdom to provide for disaster—even to a two-week supply of food in a hole in the ground.

Property Is the Fruit of Labor

PROPERTY is desirable. It is a positive good in the world. That some should be rich shows that others may become rich, and hence is just encouragement to industry and enterprise.

Let not him who is houseless pull down the house of another, but let him work diligently and build one for himself, thus by example assuring that his own shall be safe from violence when built.

Abraham Lincoln—1864.

Bear the Burden

WHEN is the time for brave men to exert themselves in the cause of liberty and their country, if this is not? Should any difficulties that they may have to encounter at this important crisis, deter

them? God knows, there is not a difficulty, that you both* very justly complain of, which I have not in an eminent degree experienced, that I am not every day experiencing; but we must bear up against them, and make the best of mankind as they are, since we cannot have them as we wish.

George Washington

(To Major General Philip Schuyler, December 24, 1775)

* Generals Schuyler and Montgomery.

Abstract of Article entitled "Physical and Biological Properties of Virus Components Obtained After Ether Treatment,"* by Davenport, Fred M.; Rott, Rudolph; and Schäfer, Werner. The complete article appears in a current issue of the *Journal of Experimental Medicine,* Vol. 112, No. 5:765-782, Nov. 1960, with whose kind permission this abstract is published.

Classification of animal viruses is at present an inexact art depending on a number of factors, such as morphology, diseases produced, epidemiology, etc. The results of this investigation suggest an additional parameter that may prove useful, i.e., the morphology and the reactivity of component parts of viruses. Influenza A viruses possess a lipid containing surface which is disrupted by ether yielding at least two well defined subunits. In fact, the Rostock strain of Fowl plague, the Swine, A, A-prime, and Asian strains of influenza A as well as their hemagglutinin and internals antigen subunits obtained after ether splitting, were found to be morphologically indistinguishable when examined simultaneously. Hemagglutinin fractions reacted in a highly strain specific manner when tested by hemagglutination inhibition or by complement fixation using sera obtained after infection. With the same sera internals antigen fractions were shown to be serologically distinguishable by complement fixation.

Since the presence of hemagglutination-inhibiting antibodies correlates well with resistance against influenza, a significance of these findings may be to open the way for developing refined influenza virus vaccines that would contain a higher proportion of the essential protective antigens and possibly might produce a lower rate of undesirable febrile reactions. Finally, the findings encourage an immunologic approach to the study of nucleoproteins.

* This investigation was conducted under the auspices of the Commission on Influenza of the Armed Forces Epidemiological Board, and was supported by the "Deutsche Forschungsgemeinschaft," Bad Godesberg, Germany, and the Office of The Surgeon General, Department of the Army, Washington 25, D.C.

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Around the World

(Ser. IV, No. 2)

By
CLAUDIUS F. MAYER, M.D.

BOMBAY is worried about the health education of its citizens. A member of the Public Health Department of that city wonders why some apparently well planned health programs fail. We can afford experts' opinions easily and rapidly, but it is relatively more difficult and time consuming to educate or to convert the public opinion, and more so in a democratic country where the will of the people cannot be overrun by experts. A good illustration of this is the matter of *smallpox in Bombay.* Effective measures are still awaited, not because they are unknown or beyond resources, but because public opinion has still not become favorable to periodic revaccination. No legislation could be passed on this matter. Health legislation without preceding education of the public will bear no fruit. But the passing out of pamphlets and folders, the organization of meetings on which statistical charts are shown is not an education. Education must be more than mere information about health affairs. Health education demands change in habits and attitudes which can be properly done only with stirring up a lot of emotion. Among the best *tools of health education,* films can play the most effective role in Bombay, while the best opportunities for mass education are offered in the schools where the teachers could make the future generations more health-conscious.

A study from the Medical Department of Singapore General Hospital showed that the number of *deaths from leukemia in Singapore* has been increasing during the past decade. The commonest type of leukemia in the Chinese of that city is the acute form, which accounts for about 68% of the cases. Most patients belonged to the 10-19 years' age group. Chronic forms of leukemia are rare in this area. We should like to know how much the contamination of the Singapore air with radioactive substances has increased during the same decade.

In *Madras State* a College of Integrated Medicine opened recently. This college is attempting at an integration of the different systems of medicine prevalent in India. The College is, however, opposed by the University and by the Indian Medical Council. Similar attempts of uniting modern medicine with the *Ayurvedic medicine* failed in other states of India. One of the difficulties is that there are few (if any) qualified teachers with knowledge and experience of Ayurveda and modern medicine.

Plague is no more the menace it used to be in previous centuries when epidemics of the "black death" devastated whole continents. Just a little more than 200 years ago, plague was the cause of 50,000 deaths in Marseilles alone. The most recent reports of the world statistics put the total number of deaths by plague at 300 for the year 1959. Whether this is just a secular recession in the morbidity of plague, due perhaps to some changes in the epidemic setup of the disease, or a true evanescence of the disease, no one can yet tell. We must believe that plague may erupt at any moment, and that it may be the disease of a future war. The countries where it used to be endemic continue their vigilance and research. Iran, the Middle East, India, and Java make intensive efforts to track down the foci of plague in wild and field rodents, and to find the origin of sporadic human outbreaks. In Iran (also in Morocco) plague *can be transmitted to man by the human flea,* the Pulex irritans. Health control work must be uninterrupted to keep the disease in check. Russian research showed that *camels also can be infected* with plague, and they can be responsible for infecting people who are engaged in slaughtering of such animals. People who work in abattoirs are now best

immunized against plague by means of a dried, live plague vaccine. In India, plague is now mainly *a rural disease,* subject to seasonal outbreaks. The shift of plague in India from cities to villages is partly due to the fact that *Rattus rattus,* which is mainly a city dweller, and which is preferred as a host by the plague-transmitting fleas (Xenopsylla cheopis) has appreciably decreased in recent years, and, though the rural rat citizens (Baudicota bengalensis) are on the increase, they are not very attractive to this species of flea. This flea has the universal ability of every living being to develop resistance against unfavorable external influences. In India, the rat fleas have become DDT-resistant at several localities. We may surmise that even the plague bacillus will change its biological characteristics. Many strains and *mutants of Pasteurella pestis* have been described which differ from each other culturally, biochemically, serologically. Four main varieties are generally still distinguished: the oriental, the ancient, the medieval and the mixed. The ancient kind is found for instance in the Belgian Congo and in Mongolia, the medieval kind in Kurdistan and South-East Russia, the oriental even in Hawaii and in the U.S., and the mixed in South Africa, Japan, and elsewhere.

A statistical study of the *geographical correlation of cancer death rates* was made by members of the Tohoku University School of Medicine in Sendai. The study included the 1954-55 data of 23 countries. The male cancer death rate was the highest in Finland, followed by Scotland, Austria, England and Switzerland; the rate was lowest in Israel. The female cancer death rate was the highest in Denmark, then in Chile, and the lowest in Japan. The esophageal cancer mortality rate is particularly high among the Swiss males and the Finnish females. It is the lowest among males in Sweden and among the white females in the United States. Stomach cancer deaths are high in Chile, Japan and Finland, but they are low in the U.S. Intestinal cancer is taking many more Scots for victims than Chileans or Japanese, while the rectal cancer death is the most frequent among the males of Denmark, and the least frequent in Chile. The pancreatic and prostatic cancer deaths are the highest among the colored people in the U.S. In lung cancer deaths, England and Wales are on the first place, and Japan at the tail end of the statistics. Most women who died from breast cancer were recorded in Denmark, while the uterine cancer deaths are exceptionally high among colored women in the U.S.

Another current study showed that *in Africa the frequency of primary liver cancer* varied greatly from one part of the continent to another. But even at its lowest level, it was far higher in African Negroes than in the American Negroes, or in the African white people. Thus, liver cancer becomes a major problem in Africa. In fact, at some regions of that continent it is more frequent than liver cirrhosis. Moreover, almost 50% of the liver cirrhosis cases in Africa will be complicated by cancer. Yet, pathologically, liver cirrhosis seems to be the same kind of disease there as elsewhere. Many of the suspected causes could be excluded in connection with both African diseases. For instance, no evidence supports a suspicion of toxic native brews or drinks. The Moslems of West Africa, who are forbidden to drink alcoholic beverages, showed, at Dakar, probably the highest frequency of malignant *hepatoma.* Indeed, the cause of the great bulk of cases of primary liver cancer is not yet known, either in Africa or elsewhere.

The migration of many natives to urban areas of the *Union of South Africa* resulted in a change of the *way of life of many Bantus.* They no more lead a primitive life, but one which can be called semi-European. With such change, the incidence of certain diseases has also changed. Diabetes mellitus is one of them. This ailment is usually very rare among African Negroes; it is much more frequent, for instance, among American Negroes. A recent survey in a primitive out-patient community among the Basutos resulted in figures which show that *diabetes*

among the Basuto population has a very low incidence (ca. 0.23% with sugar levels above 140 mg%). This primitive population was living on a low-calorie diet, consisting mainly of carbohydrates. We still remember that even during the shortages of the Second World War the use of such a diet resulted in a reduction of diabetic mortality in many European states.

Ankylostomosis in Somaliland is a social disease of such seriousness as tuberculosis, malaria or syphilis. It is a very widely distributed disease which, according to the observations of an Italian physician at Benadir, may be present in about 34 to 65% of the population in the various districts. In the agricultural areas of the country, ankylostomosis is almost an occupational disease. It creates the same vicious circle that it produced in the U.S. in the south: malnutrition —"laziness" (lowered working capacity)— poverty. Unfortunately, the Somali government had not yet made any overall survey of the morbidity rate. Neither is there any official program for the fight and eradication of this plague from Somaliland.

Last year's *Nobel Prize* in medicine was awarded to Sir Frank Macfarlane *Burnet* (*1899—), director of the Walter and Eliza Hall Institute of Medical Research in Melbourne, Australia, and to Prof. P. B. Medawar, a Brazilian by birth, now professor of zoology and comparative anatomy at the University College of London. The award was made for their work on the problem of *acquired immunological tolerance* the idea of which was first formulated in a book of Burnet (& Fenner) under the title *The Production of Antibodies.* Burnet postulated that the body should be able to distinguish clearly between its own tissue substances, and matters which enter the body extraneously (infection, transfusion). Foreign substances are eliminated with the intervention of antibodies, whereas the body's own substances are disposed of otherwise. Medawar had demonstrated that skin grafts transplanted from one individual to another of the same species are destroyed due to an actively acquired immune response. Yet, he also discovered that cattle fraternal twins accepted skin grafts exchanged between them. These biological conditions can be changed by injection of suitable antigens at the embryonal stage.

Air pollution has been blamed for many ill effects on health. We still remember the English fog of December 1952 when London was covered in fog for almost a week, and the morbidity rate became very high for respiratory and even for heart diseases, and many more people died than usually. Many preventive measures have been suggested to prevent air pollution. Looking backwards in history, we find that already in 1273 the English Parliament passed an act forbidding the *burning of coal in London,* and that in 1306 a man was executed for doing so. We also remember the bad effects due to industrial pollution of the air as in 1930 in the Meuse Valley in Belgium, in 1948 at the town of Donora in the U.S., and in 1950 at Poza Rica in Mexico. And what about the endemic "smog" of Los Angeles? A tremendous amount of research went on to find the actual irritants in the polluted atmosphere. It is believed that the oxides of nitrogen and hydrocarbon (mostly olefines) which arise from the combustion of petroleum products (chiefly of gasoline) are photochemically changed by the ultraviolet rays of the sunlight. The *effect of atmospheric contamination on the human body* is not well known. Of course, much harm may be caused. The short-term effects are all kinds of biochemical reactions, producing local irritations on parts of the body. The long-term effects also include a *stimulation of cancer.* Where can we find any remedy? Industry is spreading, and it is carrying pollution in its wake. Our best friends may contaminate the air we breathe with their selfish cigarettes. The most effective measures are still the state and local regulations in the U.S. which sometimes are very strict, and may have an astonishing improvement of the air in the cities. Perhaps the radioactive fission material now in the air will instigate people to a more efficient control of air contamination all over the world.

A very bad focus of *dental fluorosis* was found among the inhabitants of *Brava,* one of the Cabo Verde Islands where at some places the waters contain 11.52 p.p.m. fluorine. The suggestion was made that the inhabitants could be taught to mix their well-water with rain-water.

Portugal is not free of *leptospirosis.* Examination of kidneys of pigs from several parts of the country, slaughtered in the Lisbon Municipal Slaughterhouse, resulted in the isolation of *Leptospira pomona* and *L. hyos.* They both cause similar affections in pigs, guineapigs and man. The common reservoir is the pig. The L.hyos may also cause a skin rash on the 4th-6th day of the infection, which may resemble scrub typhus. The most prominent symptoms are those of a lymphocytic or serous meningitis. The excretion of the parasite through the kidneys may last several (4-5) weeks, according to the data of the Portuguese Institute for Tropical Medicine.

Obstetrics seems to be a craftsmanship in which we can hardly imagine that anything new can be added to the traditional old tricks of the midwives. Nevertheless, there is an occasional forward step even in the management of child deliveries. Such is the *use of vacuum extractors* or of "ventouse" in place of the ancient forceps. The vacuum extractor consists of a flattened round metal cup with bulging sides. When it is correctly applied to the occiput of a fetal head at term, an artificial "caput succedaneum" is created which occupies the free space within the cup. This has a button-like form (The French obstetricians call it "chignon") on which *strong traction may be applied without risk* to mother or child. The cup—which in principle had been already described in 1849 by Simpson—came into vogue during the past decade, mainly due to the efforts of Belgian and Scandinavian obstetricians. In European hospitals and private practice it is used with satisfaction more and more, as a recent *symposium of the Royal Society of Medicine* showed.

The main center of studies in *tuberculosis in Italy* and of postgraduate training of specialists in phthisiology is the *Carlo Forlanini Institute* in Rome. It was founded in 1934, and named after the great Italian master of phthisiology. The Institute is actually a hospital city which permits the activities of scientific research, houses the tuberculosis clinic of the Rome University, and has a large hospital for the Italian Social Insurance system. There are also an outpatient department and a diagnostic center, a museum for social medicine and medical statistics, schools for the rehabilitation of the tuberculous, and facilities for the determination of their work capacities. There are various laboratories in the Institute, including one for electron microscopy. The staff of the establishment consists of 1300 persons, among them more than 100 doctors, and 200 nurses. The Institute publishes its quarterly "Annali," also a bimonthly "Rivista," and some monographs. Since its creation, it produced more than 2000 Italian tuberculosis specialists.

Goiter is a predominantly rural disease in *Italy,* and it is gradually shifting from the North to the South. It is interesting that in 1940 goiter appeared in the Alps and in the Piedmont plain in the form of *an epidemic.* Thousands of troops were then struck in the Cuneo province at the beginning of World War II. The epidemic lasted for about 5 years, then it shifted to provinces and towns in Lombardy, and more toward the south. The Piedmont epidemic had also produced goiter in dogs, sometimes even in pigs. It was a type of parenchymatous goiter, with cellular hyperplasia or with increased colloid. The patient also showed other than thyroid symptoms such as burning sensation in the eyes and throat, nystagmus, severe headaches, insomnia, sexual erethism followed by protracted impotence and reduction in the size of the testicles, and polyuria. Most goiters receded in a few months, but some passed over into a chronic stage. It was remarkable that the administration of iodine had no effect upon it. No food factors are incriminated in Italy, neither goitrogenous substances nor the lack of iodine. At some classical sites (mountains and adjacent plains), *cretinism and deaf-mutism* are also found, but surprisingly,

all the cretins do not show clinical, mental or physical manifestations of a thyroid deficiency; rather, many proved to have hyperactive thyroid glands.

The *St. Vincent Prize for Medicine* is a newly founded (1950) prize which is awarded by the Medical Academy of *Torino,* and some regional medical societies to honor the prominent achievement of certain medical workers. The sum of 10 million Italian lire was first given to Selman A. Waksmann, Director of the Microbiological Institute at Rutgers University (USA) in 1954. The second time the prize was awarded in 1957 to Alessandro Vallebona, professor of radiology at the Genova University, for his stratigraphic method of radiological diagnosis. The award is usually given every three years in June. It is held in high esteem by the recipients, just as much as a Nobel Prize.

Some *victims of the concentration camps* of World War II had again gathered in 1960 at Oslo to have a Conference on the later effects of imprisonment and deportation. The conference was organized by the World Veterans Federation. One of the speakers was the French Prof. Richet, himself an internee in a Nazi concentration camp. The professor said that all over the world there are more concentration camps and more internees now than during the last war. According to his estimate, the inmates of these camps now exceed 25 million. The after-effects of deportation are an illness of the future. Former deportees will prematurely age, and will die early. One year of concentration camp will age a man as much as three years of campaigning.

In the last third of the summer of last year, the WHO regional office for Europe organized a training course on the *natural foci of infection* which was held in the U.S.S.R. The course was concerned with the control of insect-borne diseases in rural areas. The formal lectures were held at Moskva and Leningrad where the concept of the natural foci of infections was first formulated by Prof. Pavlovsky. Field work was also carried out with research in the *Georgian SSR.* The diseases which the course included were plague, tularemia, leptospirosis, toxoplasmosis, tick borne rickettsiasis. The role of mammals and birds was also studied, together with the vectors such as mosquitoes, sand-flies, fleas, mites and ticks.

Dr. Hahnemann will probably turn over in his grave, because *Soviet scientists condemn homeopathy.* Twenty-five of the best medical scholars wrote an open letter to Izvestia in which they criticized homeopathy as a non-scientific tendency in modern medicine. The letter writers have no doubt that the homeopathic therapy may have some suggestive effect, but they do not like the attitude of the Soviet Ministry of Health which is assuming a neutral position in this matter.

Sir! If you have a diarrhea, you may blame it on your pet turtle. It happened in England that one of the public health laboratories received a stool specimen from a diarrheic patient. The bacteriologist identified the *cause of enteritis* as Salmonella abony. This salmonella happens to be a common parasite in the intestine of the tortoise. Further inquiry revealed that the diarrheic patient had a *pet turtle* in the garden, right then in the hibernating period. It was picked up, carried to the health laboratory, but it will take quite a few years until the tortoise can be made germ-free. These animals are supposed to be kept in some kind of contraption called the *"tortorium"* where, after a sluggish period, they will eventually become ready for human petting without any health hazards! . . . *Multa paucis!*

The Sir Henry Wellcome Medal and Prize

COMPETITION FOR 1961

THE competition is open to all medical department officers, former such officers, of the Army, Navy, Air Force, Public Health Service, Veterans Administration, The National Guard and the Reserves of the United States, commissioned officers of foreign military services, and all members of the Association, except that no person shall be eligible for a second award of this medal and prize and no paper previously published will be accepted.

The award for 1961, a medal, a scroll, and a cash prize of $500, will be given for the paper selected by a committee composed of the Association's vice-presidents which reports on the most useful original investigation in the field of military medicine. The widest latitude is given this competition, so that it may be open to all components of the membership of the Association. Appropriate subjects may be found in the theory and practice of medicine, dentistry, veterinary medicine, nursing and sanitation. The material presented may be the result of laboratory work or of field experience. Certain weight will be given to the amount and quality of the original work involved, but relative value to military medicine as a whole will be the determining factor.

Each competitor must furnish six copies of his paper which must not be signed with the true name of the author, but are to be identified by a *nom de plume* or distinctive device. These must be forwarded to the Secretary of the Association of Military Surgeons of the United States, Suite 718, 1726 Eye St. N.W., Washington 6, D.C., so as to arrive at a date not later than 15 June 1961, and must be accompanied by a sealed envelope marked on the outside with the fictitious name or device assumed by the writer and enclosing his true name, title and address. The length of the essays is fixed between a maximum of 10,000 words and a minimum of 3000 words. After the winning paper has been selected the envelope accompanying the winning essay or report will be opened by the Secretary of the Association and the name of the successful contestant announced by him. The winning essay or report becomes the property of the Association, and will be published in MILITARY MEDICINE. Should the Board of Award see fit to designate any paper for "first honorable mention" the Executive Council may award the writer life membership in The Association of Military Surgeons, and his essay will then also become the property of the Association.

NOTES

Timely items of general interest are accepted for these columns. Deadline is 1st of month preceding month of issue.

Department of Defense

Asst's Secretary (Health & Medical)—HON. FRANK B. BERRY, M.D.

Deputy Ass't Sec'y—HON. EDW. H. CUSHING, M.D.

MEDICAL MUSEUM

The Medical Museum of the Armed Forces Institute of Pathology has been moved from the location that it has been in for many years to Jefferson Drive, between 6th and 7th Streets, SW, on the Mall, Washington, D.C. These buildings, too, are temporary ones and are scheduled for demolition in the reconstruction of this area of Washington. It is the hope of those concerned that the new National Library Building now under construction at the National Institutes of Health area in Bethesda, Maryland, will be completed in time to allow the Medical Museum to reoccupy the old building at 7th Street and Independence Avenue, a structure which was built for it over 80 years ago. While that building itself could stand some reconstruction it would be an improvement for this very important Medical Museum over the facilities that have been provided for it in the past years.

GEOGRAPHIC PATHOLOGY DIVISION, AEIP

A new division, the Geographic Pathology Division, has been formed at the Armed Forces Institute of Pathology, Washington. Dr. Chapman H. Binford, Registrar for Leprosy, American Registry of Pathology; and Research Pathologist, Leonard Wood Memorial, will head the new division.

This new division will have four branches: Geographic Pathology, Nutritional Pathology, Bacteriology, Immunology and Infectious Diseases, and Leprosy.

ORAL PATHOLOGY COURSE

Pathology of the Oral Regions, a postgraduate course, will be held at the Armed Forces Institute of Pathology, April 10-14. The course is designed to present to dentists and physicians, both civilian and military, the latest developments in the field of Oral Pathology. Specialists from civilian dental schools and various governmental agencies as well as from the staff of the Institute will present the material.

Army

Surgeon General—LT. GEN. LEONARD D. HEATON

Deputy Surg. Gen.—MAJ. GEN. THOMAS J. HARTFORD

ANNIVERSARIES

The Army Nurse Corps which is the oldest of the women's military services, celebrated its 60th anniversary on February 2. The Corps has over 3000 members stationed at Army installations in the United States and throughout the world. The present Chief of the Army Nurse Corps is Colonel Margaret Harper who became the eleventh chief in September 1959.

The Army Dental Corps will celebrate its 50th anniversary on March 3. There are approximately 1800 dentists on active duty. The present Chief of the Army Dental Corps who is also Assistant Surgeon General for Dental Activities is Major General Joseph Bernier.

RETIRED

Major General Alvin L. Gorby, MC, USA, was retired from the Army on his 60th birthday, January 31, 1961. At the time of his retirement he was Commanding General of the Valley Forge General Hospital, Phoenixville, Pa.

General Gorby is a native of West Virginia. He received his medical degree from the University of Oklahoma in 1925 and entered on active duty in the Army Medical Corps.

TO VALLEY FORGE GH

Colonel Henry S. Murphey, MC, who has been Chief of the Ear, Nose and Throat Service, Walter Reed General Hospital, has been assigned to Valley Forge General Hospital as Commanding Officer. It is expected that he will be promoted to general officer.

DENTAL CONFERENCE

The 36th Annual Greater New York Dental Conference was recently held at the Hotel Statler-Hilton, New York. Members of the military services were in attendance as well as civilian dentists.

Army Photo

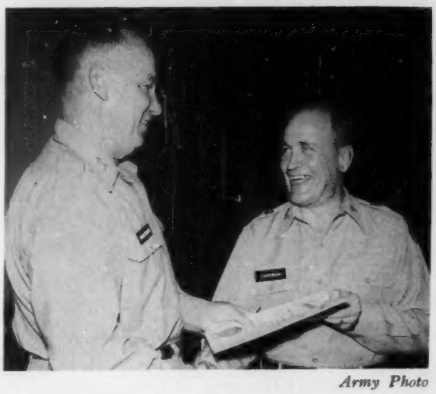
(*L to R*) Lt. Col. Richard L. Howard, DC, USA, Surg. Gen. Office, Washington; Col. James Q. Simmons, MC, USA, First Army Surgeon; Maj. Gen. Joseph L. Bernier, Chief, Army Dental Corps; Dr. William H. Hyde, Brooklyn, N.Y.

LIFE MEMBERSHIP, AMS

Colonel Edwin S. Chapman, Director of the Department of Military Science, Army Medical Service School, Fort Sam Houston, Texas, was recently presented with the Life Membership Certificate of the Association of Military Surgeons of the United States.

The presentation was made by Major General John F. Bohlender, Commanding General of Brooke Army Medical Center.

Colonel Chapman was awarded Life Membership as a prize in winning honorable mention in the annual Sir Henry Wellcome Medal Prize Contest for his essay, "The Community in Disaster," which appears in this issue of MILITARY MEDICINE.



Army Photo

General Bohlender presents Colonel Chapman with the Life Membership certificate of the Association of Military Surgeons of the United States.

STUDENT NURSES

The Army Student Nurse Program has been revised to provide tuition, fees, higher rank and salary to students in four-year nursing schools.

Qualified female student nurses who have completed the first two years of a program leading to a bachelor's degree in nursing may participate in the program.

Qualified students may enter the new Army Student Nurse Program during their junior or senior years. Junior year participants will hold the rank of E-1 in the Women's Army Corps Reserve. If room and board are not furnished by the school they will receive more than $200 a month. After four months they will be promoted to the

rank of E-2. At the beginning of the senior year, these students will hold the rank of E-3, and six months before graduation they will receive a second lieutenant's commission in the Army Nurse Corps.

Those interested should write to the Surgeon General, Department of the Army, Washington 25, D.C., Attn: MEDPT-MP.

HONORED

Major Elizabeth M. Nachod, AMSC, Chief of the Occupational Therapy Section at Fitzsimons General Hospital, Denver, has been elected to the Board of Management of the American Occupational Therapy Association.

Captain Wilma L. West, AMSC, Reserve, consultant to the Surgeon General of the Army in occupational therapy, has been named President-Elect of the American Occupational Therapy Association. She is editor of a recently published book, "Changing Concepts and Practices in Psychiatric Occupational Therapy."

Major Josephine Lydon, AMSC, Chief, Food Service, Madigan General Hospital, Tacoma, was chosen as one of four "men and women of the year" by the Tacoma Federal Business Association. The awards were made on the basis of contributions to the federal service and the community plus personal qualifications.

ADVANCED DENTISTRY COURSE

Dentistry Advanced, Class #25, started its 16-week instruction period at the Walter Reed Army Institute of Research on January 16. The Director of the course is Colonel Thomas A. McFall, who is also director of the Division of Dentistry at the Institute.

This course is presented at periodic intervals to dental officers of the Army and allied nations to provide review and refresher experience in applied sciences and recent advances in all aspects of general dentistry.

CIVIL DEFENSE HOSPITAL

Recently the 311th Field Hospital, a Cincinnati reserve Army medical unit commanded by Colonel Carl E. Roush of that city, participated in a simulated disaster problem in which the 200-bed emergency hospital of the Federal Civil Defense Administration was used.

The newly opened training center at Cincinnati will train casualty teams, nurses, technologists and hospital personnel in the treatment of mass casualties.

Under a joint agreement between the Army and Office of Civil Defense Mobilization, reservists may be called upon to help hard pressed civil defense volunteers in time of emergency.

PORTABLE FIELD X-RAY UNIT

A compact diagnostic field x-ray unit, weighing approximately 85 pounds, and which can be carried in a medium-size suitcase, has been developed for the Army Medical Service.

An important feature of the new device is that it provides a diagnostic X-ray at such speed that it will not blur during chest radiography while the patient is normally breathing.

The unit operates on rechargeable batteries.

The unit is the result of research at the Linfield Research Institute, McMinnville, Oregon.

Navy

Surgeon General—Rear Adm. Edward C. Kenney

MILITARY MEDICAL TRAINING COURSE

Periodically a course is conducted at the National Naval Medical Center, Bethesda, for Reserve Medical, Dental, Medical Service Corps, and Nurse Corps officers of the Army, Navy, Air Force and Public Health Service dealing with military medical training.

The next such course will be held during March 12-25. The course will include material on the Management of Mass Casualties and the Medical Aspects of Thermonuclear, Biological and Chemical Warfare

Disaster Control. Other features will be the effect of extremes of environment upon military operations on a world-wide basis.

TRACHOMA REPRODUCED IN ANIMALS

The first reproduction of chronic trachoma in experimental animals has been reported by scientists attached to the U. S. Naval Medical Research Unit #2 at Taipei, Taiwan.

Dr. San-Pin Wang working with monkeys was able to reproduce the disease in one monkey, although nearly a hundred were used in the experiment. However, the fact that the disease has been reproduced only in one gives encouragement for further investigation.

Trachoma is a dreaded disease because of the chronic state which frequently leads to blindness.

Sometime ago in this journal a report of the development of trachoma vaccine at the same laboratory was made. Recent reports are to the effect that one more year will be required to evaluate the results of the vaccine.

MASS HEARING TESTS

An electronic tape system, called the T-2 Automatic Audiometer, has been developed for the Navy. This device can automatically test the hearing of ten persons at one time, in a period of 12½ minutes, and use only one technician in doing so.

In operation, the persons being tested sit in a soundproofed room and hear through earphones a pre-selected number of sound pulses at each checking level. They respond by pushing the button indicating the number of pulses they hear. This information is then automatically recorded on a special test card for each individual.

It is believed possible to extend the system to allow for the testing and recording of the hearing of 50 persons at one time.

APPOINTMENT

Captain Joseph P. Pollard, MC, USN, has assumed the position of Special Assistant for Medical and Allied Sciences at the Office of Naval Research, Washington.

RETIREMENTS

Recently retired Medical Corps Officers of the Navy are: Captains William H. Druckemiller and James L. Fuelling.

Recently retired Medical Service Corps Officers of the Navy are: Lieutenant Commanders Thomas G. Leach, Raymond A. Nygren, Maurice L. Smith, James R. Swindal.

Air Force

Surgeon General—MAJ. GEN. OLIVER K. NIESS

Deputy Surg. Gen.—MAJ. GEN. JOHN K. CULLEN

RADIATION AND SPACE

The three School of Aviation Medicine mice—Sally, Amy, and Moe—that made a 600 mile trip into space last October were reported to have received less than 1 Rad of radiation.

The trip was made from Cape Canaveral, Florida, to Ascension Island, a rocket flight of 4400 miles. During this trip they were exposed to weightlessness for more than 20 minutes. Amy recently gave birth to a litter of five black mice.

Experiments with animals must, of course, precede the trips of the astronauts into space. The first trip is scheduled for this year. By the end of 1961 we might have a story of "Mice and Men in Space."

Specimens contained in a 3 pound aluminum capsule aboard the Discoverer XVII which orbited the earth 31 times last November have been examined at the School of Aviation Medicine, Brooks Air Force Base, Texas.

Dr. George W. Crawford, nuclear physicist, said, "Our specimens received not more than 30 to 35 Rad during the 50 hours they were in space. They were in space during one of the largest solar flares ever recorded, and were exposed to the radiations from this flare for 50 hours, starting just seven hours

after the flare began. This was the first time specimens from this country were exposed to a solar flare of this magnitude for such an extended time period, at such an altitude (618 miles), and recovered for detailed analysis in the laboratory."

Further on the subject, Dr. Crawford said, "We feel that heavy shielding (lead or gold as opposed to aluminum) may be harmful." It appears that the dosimeters indicated better protection with aluminum than with lead.

Dr. Jesse N. Phillips, Jr., a biologist at the School said that algae carried in the capsule showed no effect from radiation.

RETIRED

Colonel James S. Fisackerly recently retired from the Air Force after 26 years service in the military forces. He was rated as a Chief Flight Surgeon. He plans to practice Eye, Ear, Nose and Throat in Biloxi, Miss., (309 Reynoir Street).

REDESIGNATED

Ladd Air Force Base, Fairbanks, Alaska, which was the first U. S. Air Force Base in Alaska, was turned over to the Army on January 1, 1961 and redesignated *Fort Jonathan M. Wainwright* in honor of General Wainwright, hero of Bataan and Corregidor and later a Japanese prisoner of war.

Public Health Service

Surgeon General—LUTHER L. TERRY, M.D.
Deputy Surg. Gen.—JOHN D. PORTERFIELD, M.D.

APPOINTMENT

Dr. John C. Cutler, USPHS, has been appointed Assistant Director of the Pan American Sanitary Bureau, Regional Office of the World Health Organization, Washington, D.C., 1501 New Hampshire Avenue, N.W.

The Pan American Sanitary Bureau is the operating arm of the Pan American Health Organization. The Bureau was founded in 1902 and is the world's oldest international health organization. Since 1949 it also serves as the World Health Organization's Regional Office for the Americas.

REGIONAL NURSE CONSULTANT

Anna M. Matter, R.N., B.S., M.P.H., has been appointed Regional Nurse Consultant for the Public Health Service staff in the Region VI office of the Department of Health, Education, and Welfare, Kansas City, Mo. She succeeds Marjorie Spaulding, who has been reassigned.

Miss Matter will provide consultation to State Health Departments and local health agencies on the provision and evaluation of nursing services in seven States: North Dakota, South Dakota, Minnesota, Nebraska, Iowa, Missouri, and Kansas. She will also work with nursing schools in matters pertaining to public health educational programs.

RECENT PUBLICATIONS

Health Insurance, an interim report, July-December 1959 (PHS Publ. No. 584-B26) contains the results of a preliminary study on the proportion of the population covered by hospital insurance, surgical insurance, and doctor visit insurance according to selected characteristics of the population. This is one of the publications of Health Statistics from the U. S. National Health Surveys. Price 45¢ from U. S. Government Printing Office, Washington, D.C.

Hernias (PHS Publ. No. 584-B25) is a 22-page report covering the period July 1957-June 1959. The booklet contains statistics on the prevalence of hernias and associated disability by age, sex, and medical care status. Price 25¢ from Government Printing Office.

Nurses in Public Health (PHS Publ. No. 785) is a 52-page booklet, the report of the twentieth census of nurses employed for public health work in the United States and its territories. This is a statistical report containing much data pertaining to public health nurses. Single copies may be obtained

free from the Government Printing Office, Washington.

LEAFLET AVAILABLE FOR TRAVELERS

So You're Going Abroad is a leaflet which will be a companion for a series for specific areas outside the United States. This leaflet contains general information about food, water, activity, etc. These can be obtained for 5¢ each, or $3.75 per 100 from the Government Printing Office, Washington. These would be excellent for physicians to hand their patients who are contemplating a trip abroad.

Veterans Administration

Chief Medical Director—WILLIAM S. MIDDLETON, M.D.
Deputy Chief Med. Dir.—H. MARTIN ENGLE, M.D.

ASSIGNMENT

Dr. Allen W. Byrnes, has been named manager of the Veterans Administration hospital at Knoxville, Iowa. He succeeds Dr. Albert L. Olsen who was assigned as manager of the VA hospital at Sheridan, Wyoming.

Dr. Byrnes was in the Army Medical Corps during World War II.

MOUTH CANCER

Every dental patient should have a thorough inspection of the oral cavity. In addition smear tests could be made to assist in the early detection of mouth cancer.

Such smear tests have been under study at twelve Veterans Administration hospitals and outpatient clinics for a little more than a year now. The method consists of scraping cells from the surface of the suspect mouth tissue with a wooden tongue depressor, spreading the cells on a glass slide, staining them, and examining them under a microscope. When there is any suspicion that cancer is present a biopsy is performed.

Dr. Henry C. Sandler, Chief of the Dental Service at the Brooklyn, New York, Veterans Administration hospital is chairman of the cooperative study for the Veterans Administration.

BONE MARROW IMPLANTATION

The range of radiation therapy for cancer may be extended by the use of the patient's bone marrow which was removed prior to radiation. A small amount is taken and frozen, stored, and then returned to the patient after treatment.

This work has been under study at the Veterans Administration Hospital in Long Beach, California, by Dr. Nathaniel B. Kurnick. He has stated that in some of the patients so treated the blood count has returned to normal in two to four weeks.

This adds another event in the storage of human tissue which is being found to be more and more successful. We have been aware of the use of stored frozen blood at the U. S. Naval Hospital, Chelsea, Mass. At the U. S. Navy Hospital, Bethesda, Maryland there is a Tissue Bank in constant use. Material is stored by a deep freeze method.

MICRODOSIMETER

A device known as a microdosimeter, for measuring radiation dosage within the body, has been developed by a group at the Veterans Administration hospital, Bronx, New York.

The microdosimeter is less than a quarter of an inch long, is encased in a miniature gold shield and placed within the body directly or in needles and in slender nylon tubes. After radiation it is removed and exposed to ultraviolet light. This gives an orange-yellow fluorescence. Measurement of the color change by an electronic reader gives the physician an accurate measurement of the roentgens or radiation dose actually received at the site of treatment.

FIREPROOFING OF HOSPITAL ITEMS

The Veterans Administration has stocked a flame retardant paper bag for use at the bedside of patients.

Further tests are now being made on other items such as pajamas, sheets, pillow cases, curtains, etc. The compound which is being used is removed by washing and consequently will have to be used after each laundering to restore the flameproof factor.

Miscellaneous

LABELING OF DRUGS

New regulations have been adopted by the Food and Drug Administration for the labeling used to promote the sale of prescription drugs to physicians.

The new regulations require that the labeling disclose the hazards as well as the advantages of the drugs. This imposes an additional responsibility on the pharmaceutical manufacturers. But in addition there is a responsibility of the physician to acquaint himself with the literature prepared for him. This should not be taken lightly.

Since the regulations are somewhat detailed the Food and Drug Administration should be contacted for details.

HOME CARE TREATMENT

There is a greater and greater move toward reducing the stay of a patient in a hospital. With the increasing population of our country and the increasing cost of hospitalization, hospital beds must be used more effectively. The increasing load of mental cases in a State Hospital becomes one facet of concern.

A research program of preventive hospitalization in psychiatric emergencies is now being conducted by Boston University. Known as the Home Care Service of Boston State Hospital the program is headed by Dr. Walter E. Barton, superintendent of the hospital and an associate professor of psychiatry at Boston University School of Medicine. Teams consisting of a physician, a nurse trained in psychiatry, and a social worker visit emergency psychotic cases in the area. Half of the patients seen were able to avoid institutional confinement. It was found, however, that the ones that could not be effectively dealt with were generally paranoids and schizophrenics—often with suicidal tendencies.

ABSTRACTS FROM COMMUNIST TECHNICAL JOURNALS

The Office of Technical Services, U. S. Department of Commerce, is making available abstracts of selected articles from Soviet Bloc and Communist China technical journals.

The General Science and Miscellaneous abstracts can be obtained on a six-months subscription basis for $9.00. This series will include medical science, aeromedicine, and some general science subjects.

Orders should be placed with the Publications and Public Information Division, OTS, Department of Commerce, Washington.

PUBLICATIONS

The following publications are available from the Office of Technical Services, Business and Defense Administration, U. S. Department of Commerce, Washington, D.C.:

Medical, Biological, and Social and Behavioral Sciences (PB 171,000), Army Research Task Summary, Fiscal Year 1960. 444 pp., price $3.75.

Some Current Problems in the Development of Soviet Hematology. (60-31814), a translation, 8 pp., price 50¢.

A course of Lectures for Mothers (60-41380), a translation from the Russian monograph, 152 pp., price $3.00.

On Decurarization (60-41362), a translation, from Russian literature, 7 pp., price 50¢.

Experimental Surgery in the USSR (60-41176), translation, 65 pp., price $1.75.

Scientific Session of the Institute of Therapy of the Academy of Medical Sciences USSR (No. 11) (6041254), translation, 17 pp., price 50¢.

Prophylactic Inoculations Against Infectious Diseases, (60-41137), translation, 39 pp., price $1.25.

Principles of Chemotherapy in Oncology (60-41151), translation, 11 pp., price 50¢.

RADIATION PROTECTION STANDARDS

Report No. 1, a Staff Report of the Federal Radiation Council, gives background material for the development of radiation protection standards. This should be in the hands of all persons dealing with matters pertaining to radiation.

Copies can be procured from the Government Printing Office for 30¢ a copy.

EMPLOYMENT

Medical Service personnel leaving the military service who have professional or technical qualifications and who may be seeking employment may find it advantageous to contact the Department of Labor, U. S. Employment Service for the District of Columbia, Room 705—1000 16th St., N.W., Washington 6, D.C.

In contacting the employment agency it would be well to prepare an outline of your experience. This will assist the agency in locating positions. The outline should be complete, giving as many facts about yourself as possible. Suggestions for paragraphs of the outline are: objective, chronological outline of previous employment, preferred geographical area of employment, education, professional affiliations, foreign language capabilities, personal data (birth date and place, height, weight, physical limitations, marital status, dependents), date of availability. Of course, do not forget your name and address.

CHEST PHYSICIANS ESTABLISH FUND TO ASSIST CUBAN MEMBERS

The Board of Regents of the American College of Chest Physicians recently voted to contribute $5000 to launch a fund for the assistance of the Cuban members of the College who have been exiled temporarily from their country.

Headquarters of the College are at 112 East Chestnut St., Chicago 11, Ill.

NEW FILM

Inflammatory Reaction is the title of a new film, 24 min., color and sound, now available for showings to hospital staffs, medical and pharmacy meetings, and student groups. Showings can be arranged for by contacting Lederle Laboratories film library at Pearl River, New York.

New Members

Dr. John L. Spanier
Capt. Margaret B. Tinney, ANC, DC NG
Capt. William C. Turville, MC, USN
Capt. John Carr, DC, USAR
Col. Lester M. Dyke, MC, USA, Ret.
Capt. Charles G. Lewis, DC, USAR
1/Lt. Melvin B. Mitchell, MSC, USAR
Capt. Shafik Fouad Richany, MC, AUS
Lt. Col. Ralph D. Chadwick, VC, USA
Capt. Mary W. Edlavitch, ANC, USAR
1/Lt. Pauline Fedak, NC, USAF, Ret.
Miss Elizabeth A. Glander, VA
Sr. NO Marie F. Hanzel, USPHS
Lucy M. Harrington, VA
1/Lt. Lowell L. Lachelt, MSC, USAR
1/Lt. Sakado O. Russell, NC, USAF
Sr. Surg. Mahlon J. Shoff, USPHS
Capt. Andrew G. Tolas, DC, USAR
Cdr. Peter Frailey Wells, MC, USN
Capt. Robert H. Nunnally, MC, USAF
Capt. Edgar S. Joseph, DC, USAR
Major Robert W. Zellmer, MC, USAF
Major Henry K. Silberman, MC, USA
Major Virginia Sage, ANC, USAR
LCDR Tito Monroy Pittaluga, Venezuelan Navy
Sr. Asst. Vet. Officer William T. Hubbert, USPHS
Capt. Robert Eugene Cary, DC, USA
Major Catherine B. Bean, NC, USAF
Lt. Col. Herbert Hoff, MC, USA
1/Lt. Maxine Felty, CAP, MSC
Capt. Peter G. Kroll, MC, USN
Capt. George E. Wilson, Jr., MC, USA
Staff Pharm. Walter A. Blighartz, USPHS
Lt. Genevieve E. Buffone, NC, USNR, Ret.
Major Ada L. Coats, USAF, NC
Lt. Col. Daniel P. Dodd, VC, USAR

Capt. William Avery Mitchell, Jr., DC, USA
1/Lt. W. B. Pennebaker, DC, USA
Lt. Bob Edmundson Stout, MC, USN
LCDR Clara T. Szczypin, NC, USN
Maj. Gen. Chi-Yu Chu, Chinese Army
Capt. Ernesto Jorge Perez-Constitucion, MC, Argentine Navy
Lt. Col. Gordon A. Jones, MSC, USA
Cdr. Edward S. Keith, USPHS R
Col. Kung, Chuan-Chung, Chinese Army
Col. Tso-Chow, Hsu, Chinese Army
Col. Hsing-Chow, Chiang, Chinese Army
Major General Lin, Li, Chinese Army
Lt. Emerico Oscar Ronconi, MC, Argentine Navy
LCDR Henry David Baldridge, Jr., MSC, USN
Capt. Lucille A. Comarota, NC, USAR
Col. W. G. Dunnington, MC, USA
Col. J. P. Harney, MC, USAF
LCDR Mary A. Hester, NC, USN
Capt. David Minard, MC, USN
Lt. A. R. Petoletti, MSC, USN
1/Lt. Elaine G. Reed, ANC, NG
Lt. Ross V. Sayers, MC, USNR

MEMBERSHIP COMMITTEE

Commander Calvin F. Johnson, MSC, U. S. Navy, Chairman
Mr. George F. Archambault, U. S. Public Health Service
Commander Burdette M. Blaska, NC, U. S. Navy
Lt. Col. Jesse W. Brumfeld, MSC, U. S. Army
Lt. Col. Nathan Cooper, U. S. Air Force, (MSC)
Mr. Vernon O. Trygstad, Veterans Administration

Honor Roll

Since the publication of our last list, the following sponsored one or more applicants for membership in the Association:

Major Oscar F. Gutierrez, MC, USA
Capt. M. M. Mansfield, MSC, USAR
Major Edward A. Barrett, MC, USAR
Major Samuel Lieberman, MC, AUS
Capt. Charlotte E. Comley, ANC, USAR
Med. Dir. John A. Trautman, USPHS
Capt. Arthur G. Cox, USAF, MSC
Lt. Col. William A. Easter, CAP
Mr. Vernon O. Trygstad
Dr. Herman Black

Deaths

BLACKWELL, James H., Colonel, Medical Corps, U. S. Army, Retired, died November 22, 1960, at his home in Marfa, Texas. Age was 78.

Colonel Blackwell was a native of Alabama and had received his medical degree at the Birmingham (Ala.) Medical College in 1906. In 1916 he joined the Alabama National Guard. He was commissioned in the Medical Corps of the Regular Army in July 1920 in which he served until his retirement September 30, 1946. During World War I he served in the American Expeditionary Forces in France and after that in the Army of Occupation in Germany. He was an Honor Graduate of the Army Medical School, Class of 1921. Later that year after finishing the course of instruction at the Army Medical Field Service School he was retained as an instructor at the school. He also served as an instructor in Puerto Rico and at the Albany Medical College in New York. During World War II he served as Commanding Officer of the Station Hospital and Post Surgeon at Fort Ogelthorpe, Georgia, until his retirement. Since that time he had been making his home at Marfa, Texas.

He is survived by his wife of Marfa, Texas, P.O. Box 366; and two daughters, Mrs. P. E. P. Marshell, Eustice, Florida, and Mrs. Paul Smith, Washington, D.C.

Interment was at Fort Bliss National Cemetery.

DRUBIN, Lester W., M.D., Manager of the Veterans Administration Hospital, Jefferson Barracks, Mo., died November 29, 1960, after a brief illness. Age was 47.

HARWOOD, Thomas E., Colonel, Medical Corps, U. S. Army, Retired, died at

Walter Reed General Hospital, November 19, 1960. His age was 76.

Colonel Harwood was a native of Gibson County, Tennessee. He received his medical degree from Vanderbilt University in 1906 after which he practiced near Tigrett, Tennessee, until 1909. Then he decided upon a postgraduate course at George Washington University, Washington, D.C. He entered on active military duty in 1911, was sent to the Army Medical School as a student and graduated with the class of 1912. He served in the Mexican Border Campaign and with the Philippine Scouts prior to World War I. During World War I he was with the American Expeditionary Forces in France and saw action in five major battles. He was a graduate of the School for Flight Surgeons, class of 1920, and served as a flight surgeon until 1932. During World War II he was in command of the hospital at Fort Des Moines, Iowa, and later was transferred to the Office of the Surgeon General of the Army. His last duty assignment was as executive officer at the Forest Glenn Section of the Walter Reed Army Medical Center, when he was retired on August 31, 1948.

Colonel Harwood is survived by one son, Dr. Thomas R. Harwood, assistant professor of pathology at Northwestern University Medical School, Chicago; and a daughter, Sally H. Hardy, of Falls Church, Virginia.

LaROCHE, Laurent L., Colonel, Medical Corps, U. S. Army, Retired, died at Cocoa, Florida, November 2, 1960, of coronary disease. Age was 70.

Colonel LaRoche was a native of Courtenay, Florida. He graduated from the Medical College of South Carolina in 1915. He entered the military service in 1917 and served in the Army Medical Corps until his retirement in November 1946. During World War I he served with the American Expeditionary Forces in France and was awarded four battle stars. He specialized in ophthalmology and otolaryngology and served in many stations as chief of that service. He was an instructor at the Walter Reed Army Medical Center from 1939-1942 when he became executive officer. This position he held until 1944 when he became Chief Surgeon, South Pacific Base Command and then in 1945 moved into Japan with the American Forces. He was awarded during World War II the Asiatic Pacific Theater Ribbon with one battle star, the Philippine Liberation Campaign Ribbon, the Japanese Occupation Ribbon, in addition to the American Service Medal.

After his retirement he practiced his specialty until 1958 during which time he was a consultant to Patrick Air Force Base Hospital in Florida. He was a Past President of the Brevard County Medical Society.

He is survived by his widow of 403 Riverside Drive, Cocoa, Florida; two sons and a daughter.

MESSICK, H. Elizabeth, Director of the School of Occupational Therapy, Richmond Professional Institute, Richmond, Virginia, died December 1, 1960, of a heart attack; age 50.

Miss Messick started her career in 1933 as an occupational therapist at Walter Reed General Hospital, Washington, and served there until 1939 when she became Director, Occupational Therapy, Bureau Maternal and Child Health, District of Columbia Health Department. That position she held until 1944 when she became Assistant Chief, Occupational Therapy Section in the Office of the Surgeon General of the Army. In 1945 she became Chief of the section and served in that capacity until 1949 when she went to Richmond. It was during her tour in the Surgeon General's Office that the occupational therapists were given military status as commissioned members of the Women's Medical Specialist Corps with the enactment of Public Law 36.

In 1955 Miss Messick was appointed a member of the Defense Advisory Committee on Women in the Service (DACOWITS) by the Secretary of Defense. She served until 1958. In that period she chaired the subcommittee on medical services.

She is survived by her sisters, Mrs. J. Luther Heath and Mrs. James Willing, both of Baltimore. Interment was at Bivalve, Md.

RUSSELL, Frederick F., Brigadier General, U. S. Army Medical Corps, Reserve, Retired, died at the Veterans Administration Hospital, Louisville, Kentucky, December 29, 1960, at the age of 90.

General Russell was a native of Auburn, New York. In 1893 he received his medical degree from the College of Physicians and Surgeons (Columbia). He attended the University of Berlin in 1897. In 1898 he was commissioned in the Army Medical Corps, promoted to colonel in 1917, and then resigned in 1920 to join the Rockefeller Foundation as a researcher in yellow fever and malaria. In 1921 he was given the rank of brigadier general in the Medical Reserve Corps of the Army.

Doctor Russell was a bacteriologist and pathologist and distinguished himself in these fields during his active Army service as well as in his positions in civilian life after leaving the service. Chief among his accomplishments was the development of the typhoid vaccine for the military services. In 1911 vaccination for typhoid fever was made compulsory. This changed a frightful picture which had existed in wars where typhoid had accounted for considerable morbidity and mortality. While the disease has not been completely eradicated in the United States, there being about 800 cases reported in 1960, the military forces have been remarkably free from typhoid.

Doctor Russell was a member of the faculty of a number of medical schools during his very active days. He was professor of preventive medicine and epidemiology at Harvard, 1936-38, and then became professor emeritus. Honors conferred upon him by institutions in the United States and foreign nations were many. He was a Life Member of the Association of Military Surgeons of the United States.

His recent years were spent at his home: 4938 Brownsboro Road, Louisville, Kentucky.

NEW BOOKS

Books May Be Ordered Through The Association

Importance of the Vitreous Body in Retina Surgery with Special Emphasis on Reoperations. Edited by Charles L. Schepens, M.D. The C. V. Mosby Company, St. Louis. Price $15.00.

Pathology. A Dynamic Introduction to Medicine and Surgery. By Thomas M. Peery, M.D., and Frank N. Miller, Jr., M.D. Little, Brown and Company, Boston. Price $5.50.

Dynamic Psychiatry. 2nd Ed., by Robert R. Mezer, M.D. Springer Publishing Company, Inc., New York. Price $2.75.

Clinical Orthopaedics. No. 18. Internal Derangement of the Knee Joint. Editor-in-Chief, Anthony F. DePalma, with Assistance of the Associate Editors, The Board of Advisory Editors, and The Board of Corresponding Editors. J. B. Lippincott Company, Philadelphia and Montreal. Price $7.50.

Biology of Pyelonephritis. Henry Ford Hospital International Symposium. Edited by Edward L. Quinn, M.D., F.A.C.P., and Edward H. Kass, M.D., Ph.D., M.A. (hon.), F.A.C.P. Little, Brown and Company, Boston. Price $18.00.

Valvular Disease of the Heart in Old Age. By P. D. Bedford, M.D., M.R.C.P., and F. I. Caird, D.M., M.R.C.P. Little, Brown and Company, Boston. Price $7.50.

Manual of Care for the Disabled Patient. By Arthur J. Heather, M.D. The Macmillan Company, New York. Price $3.75.

Light Coagulation. By Gerd Meyer-Schwickerath, M.D. Translated by Stephen M. Drance, M.B., F.R.C.S. (Eng.) The C. V. Mosby Company, St. Louis. Price $9.50.

Thought Reform and the Psychology of Totalism. A Study of "Brainwashing" in China. By Robert Jay Lifton, M.D. W. W. Norton and Company, Inc., New York. Price $6.75.

Haemopoiesis. Cell Production and its Regulation. Ciba Foundation Symposium. Edited by G. E. W. Wolstenholme, O.B.E., M.A., M.B., M.R.C.P., and Maeve O'Connor, B.A. Little, Brown and Company, Boston. Price $11.00.

Medicine As An Art and A Science. By A. E. Clark-Jennedy, M.A., M.D. (Contab), F.R.C.P. (London); and C. W. Bartley, M.A., D.M. (Oxon), M.D. (McGill), M.R.C.P. (London). J. B. Lippincott Company, Philadelphia and Montreal. Price $6.25.

Surgery of the Aorta and its Branches. By James D. Hardy, M.S. (Chem.), M.D., F.A.C.S. J. B. Lippincott Company, Philadelphia and Montreal. Price $6.50.

A System of Medical Hypnosis. By Ainslie Meares, M.D., B.Agr.Sc., D.P.M. W. B. Saunders Company, Philadelphia and London. Price $10.00.

Surgical Diseases of the Pancreas. Edited by John M. Howard, M.D., F.A.C.S., and George L. Jordan, Jr., M.D., M.S., F.A.C.S. J. B. Lippincott Company, Philadelphia and Montreal. Price $20.00.

Procedures in Vascular Surgery. By Richard Warren, M.D. Little, Brown and Company, Boston. Price $12.00.

Radioisotope Measurement In Nuclear Medicine. By Frank H. Low. Picker X-Ray Corporation. Price $2.50.

Resuscitation of the Newborn Infant. Principles and Practice. Edited by Harold Abramson, M.D. The C. V. Mosby Company, St. Louis. Price $10.00.

Regulation of the Inorganic Ion Content of the Cell. Ciba Foundation Study Group No. 5. Edited by G. E. W. Wolstenholme, O.B.D., M.A., M.B., M.R.C.P., and Cecilia M. O'Connor, B.Sc. Little, Brown and Company, Boston.

Bedside Medicine. By I. Snapper, M.D. Grune & Stratton, New York and London. Price $14.50.

Hormones in Human Plasma. Nature and Transport. Edited by Harry N. Antoniades, Ph.D. Little, Brown and Company, Boston. Price $25.00.

Blood Diseases of Infancy and Childhood. By Carl H. Smith, M.A., M.D. The C. V. Mosby Company, St. Louis. Price $17.00.

Introduction to Medical Physics. By J. Trygve Jensen, Ed. J. B. Lippincott Company, Philadelphia and Montreal. Price $2.90.

Science Projects Handbook. For the Young Interested in Science. Edited by Shirley Moore, Science Clubs of America. Science Service, Inc., 1719 N Street, N.W., Washington 6. Price 50¢.

Modern Occupational Medicine. Edited by Allen J. Fleming, M.D., C. A. D'Alonzo, M.D., and Dr. John A. Zapp. Lea and Febiger, Philadelphia. Price $12.00.

Positive Health of Older People. National Health Council's 1960 Health Forum. National Health Council, 1790 Broadway, New York, 19. Price $2.75.

Physical Disability. A Psychological Approach. By Beatrice A. Wright, Ph.D. Harper & Brothers, New York. Price $6.00.

BOOK REVIEWS

FRACTURES, DISLOCATIONS & SPRAINS. By Philip Wiles, M.S., F.R.C.S., F.A.C.S. 67 pp., 519 illustrations. Little, Brown and Company, Boston. Price $7.50.

This small volume is essentially an atlas compiled initially as a series of display cards in the Orthopaedic and Fracture Department of the Middlesex Hospital for the use of Medical Students, House Surgeons, and Casualty Officers. Although not necessarily so intended, it serves to round out the author's recently revised textbook of orthopaedics which did not include fractures, dislocations and sprains.

The principles of treatment are necessarily dogmatic. The writing is clear with accentuation of topics being made by the use of heavy type. After making several definitions, followed by a general discussion of treatment, complications, fatigue and pathologic fractures, the remainder of the book deals with fractures on a regional basis. In this, the main portion, excellent x-ray reproductions and line drawings are used to full advantage to clarify each point. Because of the atlas-size pages it is difficult to stow this book in an ordinary book case, which may be a good thing, for the volume should be readily available for use in an emergency room or where fracture treatment is being given. It is recommended for its abbreviated and sound advice to all who treat fractures. However, it is far from a complete reference work.

CAPT. ROBERT H. BROWN, MC, USN

PLAGUE FIGHTERS. By Herman Styler. 126 pp. with illustrations. Chilton Company, Philadelphia. Price $3.50.

This is an interesting narration on the conquest of disease and mentions many of those who have played important roles. This is plague in its broadest sense not *the plague* as one disease. The conquests of the past several decades are particularly interesting. Colonel Fischer's trip to Mindanao to procure cinchona seeds is little known. This was a daring exploit during World War II.

This is an interesting and informative book.

R. E. B.

DISEASES OF THE SKIN. By James Marshall, M.D. 944 pp., illust. The Williams & Wilkins Co., Baltimore, exclusive U.S. agents. Price $15.00.

This well written "digest" version of modern Dermatology has been prepared by Dr. Marshall of Cape Town, South Africa, as a reference for the general practitioner and the undergraduate medical student. The outline of the text closely follows the form of the larger standard American dermatological textbooks. The author's orthodox approach is enhanced by the avoidance of multiple cacaphonous synonyms that usually beset dermatological writings. The book is generously "sprinkled" with black and white clinical photographs which suffer somewhat in illustrative quality by their diminutive size. However, the writer's experienced conservative and practical therapeutic counsel offered in his text will compensate the reader for this deficiency.

LT. WILLIAM M. NARVA, MC, USN

HELP-BRINGERS: Versatile Physicians of New Jersey. By Fred B. Rogers, M.D., Temple University. 125 pp. Vantage Press, Inc., New York. Price $2.95.

A delightful little book about twelve New Jersey doctors from the 17th century to the present time who attained distinction in some other field in addition to medicine. One biography is that of Thomas Dunn English the author of the famous verses about Ben Bolt and sweet Alice who wept so easily. Dr. Rogers points out that the original word was *blushed* and was converted to *wept* by a typographical error. In each of the biographies interesting details and important facts are brought out regarding the character and achievements of the man and also vignettes of the America in which he lived. Another poet was Abraham Coles, born in 1831. He was a physician with an extensive practice, a hymn writer, a fine classical scholar and was president of the Medical Society of New Jersey in the year of its centenary.

Among others described are General John Beatty who served in the Continental Army and later in the U. S. Congress; Ezra Mundy Hunt, a 19th century leader in public health; and Henry Leber Coit who was one of the first in this country to emphasize the importance of milk and its products as carriers of disease and a pioneer in milk sanitation. One of the most striking portraits is that of the American Loyalist, Dr. Jonathan Odell, a clergyman as well as physician, and a bitter satirist of the patriot cause.

Each biographical sketch is followed by a list of references. The author who is Professor of Preventive Medicine at Temple University belongs to a medical family long settled in the Delaware Valley, and his book is a fine piece of regional medical and American history.

CAPT. LOUIS H. RODDIS, MC, USN, RET.

SURVIVAL AT SEA. The Development, Operation and Design of Inflatable Marine Lifesaving Equipment. By Lieut. Comdr. G. W. R. Nicholl, O.B.E., Assoc. R.I.N.A., R.N. 166 pp., illust. John De Graff, Inc., New York. Price $6.00.

In 161 pages Commander Nicholl, a retired officer of the Royal Navy and its Fleet Air Arm gives a terse appraisal of the history and latest developments of flotation gear for individual and group survival at sea.

Historically he points out that progress in maritime matters (in this case lifesaving) is evolutionary rather than revolutionary due to naval tradition and caution. In spite of the fact that many lives have been lost because of the faults inherent to life boats, inflatable life rafts have been only recently accepted by naval and merchant fleets.

The operational use of inflatable life saving gear is thoroughly discussed from storage, launching, raftsmanship, and survival standpoints.

The technical aspects of design and development of equipment, inspection and control procedures, and accessories and emergency gear are discussed thoroughly without unnecessary or boring detail.

The appendices, bibliography and index are excellent. This sensibly small book is not only convincing, but it is written in a style which makes pleasant reading. It is stuffed with lore which should be of interest to naval architect, mariner, aviator, and explorer. It should be in the library of the naval surgeon whose preventive medical duties may involve the teaching of safety and survival at sea.

CAPT. E. E. HEDBLOM, MC, USN

DIAGNOSTIC ROENTGENOLOGY OF THE DIGESTIVE TRACT WITH CONTRAST MEDIA. A Mount Sinai Hospital Monograph. By Bernard S. Wolf, M.D.; Mansho T. Khilnani, M.B.; and Arthur Lautkin, M.D. 180 pp., 245 illust. Gune & Stratton, New York and London. Price $8.75.

In the past, many radiologists and gastroenterologists have deduced gastro-intestinal pathology from plain radiographs without the benefit of contrast media. These deductions were proved to be correct later by the use of media and other proofs such as surgery or autopsy. It remained for the authors to comprehensively review their impressions derived from the study of plain films over the years, and record their experience in this text. To their satisfaction, they found marked possibilities in their method to the trained physician in the interpretation of plain radiographs.

The authors, in their first chapter "General Principles," have assembled a remarkable number of facts from anatomy, physiology, physics, and chemistry to correlate the varying densities of the x-ray shadows on the plain film in health and disease.

The most important part of their text is the typical findings in the normal gastro-intestinal tract. Each chapter has a section illustrating and explaining these normal findings. The stomach, small bowel, and colon are covered in this manner.

This book contains may fine illustrations of plain films and are cleverly marked with arrows to aid in the clear descriptions printed below each illustration.

To be able to duplicate the observations of the authors by mastering this text will increase the powers of perception of those radiologists and gastroenterologists who use contrast media in studying the gastro-intestinal tract.

AUGUSTUS A. HALL, M.D.

THE LIFESPAN OF ANIMALS. Ciba Foundation Colloquia on Ageing. Vol. 5. Edited by G. E. W. Wolstenholme, O.G.E., M.A., M.B., M.R.C.P. and Maeve O'Connor, B.A. 324 pp., illust., with cumulative index to Vols. 1-5. Little, Brown and Company, Boston. Price $9.50.

This symposium, the last of the series begun in 1954, was held the 14th to 16th of April, 1959. Devoted to a discussion of the problems of aging and the survival of animals into the period of senesence, the participants in this, the fifth symposium on the problems of biological aging, were drawn from representative fields ranging from acturial statistics to pathology and physiology. The twenty-seven participants presented fourteen papers and in addition, engaged in recorded discussions following most of the delivered papers.

All the papers in this volume are devoted to the consideration of the lifespan and aging of intact organisms, from men and horses to bees, birds and fish. Little attention is given to the processes of cellular aging, although the fact should be mentioned that the aspects of cellular physiology that pertain have been discussed in previous symposia in this series. However, the omission from this fifth symposium of papers dealing with the recent work, albeit perhaps indirect, of geneticists and radiologists on lifespan is regrettable.

Assembled in volume five gerontologists will find considerable data from several authoritative sources in addition to some reviews and lively discussions of pertinent concepts. For the actuarially inclined, some new mathematical mortality models are included in an appendix. Most of the research papers contain previously unpublished data and conclusions.

One of the recurrent problems addressed directly or indirectly by most of the authors concerned the definition and valid use of a biological time scale for a species. In this respect, evaluating the significance of gerontological data obtained from laboratory animals remains an enigma.

Thus, volume five of this series will serve at least a dual purpose: through the list of outstanding

symposium participants, current views on animal lifespans are reviewed; and a cumulative subject and author index for all five volumes of this symposia series is provided as a supplement.

The Ciba Foundation and those persons directly responsible for the organization and presentation of this entire study of aging in animals are to be congratulated for an outstanding series of contributions. Volume five is highly recommended to all workers in the field.

DAVID B. WALDEN

MEDICAL PHYSIOLOGY AND BIOPHYSICS (18th Edition). By Theodore C. Ruck, Ph.D., and John F. Fulton, M.D., 23 contributors, 1232 pages. W. B. Saunders Company, Philadelphia and London. Price $16.00.

Many of the chapters of this book, the eighteenth edition of Howell's textbook of Physiology, have been partially or completely rewritten. This edition has emphasized the biophysical aspects of physiology and has omitted much of the material which has fallen into the realm of biochemistry. Two interesting chapters, one on the biophysics of the cell membrane and the other on the neurophysiology of emotion and motivation have been added.

As in the previous editions which have been edited by the late John Fulton, the chapters on neurophysiology in the current edition are unusually complete and well written. The chapter on kidney function and body fluids has been rewritten and provides an excellent discussion of current concepts of renal function. The chapters on the cardiovascular system are excellent, particularly the chapter on the electrical correlates of the cardiac cycle in which the author (Allen M. Scher) presents a concise and well organized discussion of the electrical activity of the normal and abnormal heart which should be of interest to every student of physiology and medicine.

This book is sufficiently well written and well organized to make it a very good textbook for students of medical physiology. Its contents are current and complete enough to make it a very valuable reference for the researcher as well as the practicing physician.

WILLIAM P. BAKER, PH.D., M.D.

COLLECTED PAPERS OF THE MAYO CLINIC AND THE MAYO FOUNDATION. Volume 51, 1959, 825 pages. Illustrated. W. B. Saunders Co., Philadelphia and London. Published June, 1960, Price $14.00.

To those familiar with the annual Collected Papers of the Mayo Clinic and Mayo Clinic publications in general, it will come as no surprise that this volume attains the excellent standards expected of Mayo authorities.

Comprised principally of abridgements of papers published or to be published in 1960 issues of various medical journals this text is as up to date and practical as possible. The papers are well planned, clearly written, and all illustrations and graphs are definitely instructive. All systems of the body and all the disciplines of medicine are represented.

This should be a most valuable book for the generalist and those specialists who wish to keep up to date on other fields. The Mayo group has both quantity and quality of clinical and research material, excellent coordination and authors who can write instructively and they speak with the voice of experience.

JULIAN LOVE, M.D.

MEDICAL HELMINTHOLOGY. By J. M. Watson, Sc.D., A.R.C.S. 487 pp., illust. The Williams & Wilkins Co., Baltimore, exclusive U.S. agents. Price $15.50.

According to the author this book is "an outcome of a course of lectures given in 1952 to medical students . . . and is the result of a demand from students and colleagues for a concise and up-to-date handbook on human helminthology." The author maintains that existing works on general parasitology and tropical medicine rarely contain sufficient biological information concerning the worm parasites of man (a point which is certainly debatable) . . . a lack which he aims to counteract by providing all of the basic facts regarding the helminths parasitic in man and the diseases caused by them. The author hopes that the book will appeal not only to clinicians, public health workers and sanitarians, pathologists and laboratory workers, but also to parasitologists, zoologists and veterinarians.

The book is comprised of three sections. Part I, consisting of 100 pages, is introductory in nature and begins with a brief historical review, followed by a discussion of the nature of parasitism, taxonomy, life cycle, physiology and ecology of the parasitic helminths. Their transmission, dissemination, immunity, pathogenesis, as well as their geographical distribution and evolution is next briefly considered.

Part II makes up the bulk of the book and undertakes a systematic account by families of the helminths parasitic in man. As in some other books the parasites are considered according to their location in the host, i.e., "Section A—Intestinal Nematodes" and "Section B—Tissue Nematodes." Section C deals with the trematodes or flukes, with chapters on trematodes of the alimentary canal, the liver, lungs, circulatory system and skin. Section D is concerned with the cestodes or tapeworms which occur as parasites of the alimentary canal, as well as the tissue inhabiting species. Short chapters treat the Acanthocephala or spiny headed worms, the Hirudinea or leeches, and the Pentastomida or tongue worms.

The clinical and public health aspects of helminthic infections are covered in the next 51 pages constituting Part III. In this section space is devoted to the diagnosis, intermediate hosts, treatment and prevention of helminthic infections. It is regretted that lineage is devoted to decrying phenothiazine as a drug for treating enterobiasis (which is generally recognized as being undesirable) and that no information is given in this section (except to list it) on its use against dracunculiasis. Furthermore it seems to this reviewer that such drugs as santonin and oil of chenopodium should be more emphatically condemned because of their toxicity.

A feature of the book consists of a series of "Appendices" which covers 46 pages. There is a section devoted to bibliographic references (in which a few publication dates are omitted and one out-of-date edition cited). Chapters are included on: Zoological Nomenclature, Helminthic Parasites of Common Laboratory Animals, Nematomorpha and Mermithoidea and Recent Advances. This last chapter includes some 38 pages and is designed to bring the text up-to-date. The only serious criticism which can be made here stems from the necessity of reading a chapter and then checking the appendix to see what has been added or changed since the original section was written. It is unfortunate that this could not have been incorporated in the text proper.

However, these few criticisms are relatively minor when the worth of this valuable edition to the field of helminthology and parasitology is considered.

COL. GEORGE W. HUNTER, III, USA, RET.

WHAT PRICE MEDICAL CARE? A Preventive Prescription for Private Medicine. By Sir Earle Page, F.R.A.C.S., D.Sc. 159 pp. J. B. Lippincott Company, Philadelphia and New York. Price $3.50.

In this timely monograph author Sir Earle Page—distinguished Australian physician, Member of Parliament and former Minister for Health—discusses all phases of "The Australian Health Plan," of which he is the originator. Anxious to repay a debt to the U.S.A. Sir Earle offers many reasons why this health plan, which is working so well in Australia, is especially applicable to our country. Although the government has certain financial responsibilities in this plan yet it is based on voluntary health insurance; is not administered by a huge government department; and both physician and patient have an incentive to avoid waste and abuse. It offers preventive as well as therapeutic benefits. Moreover it should work well with Blue Cross, Blue Shield and other good voluntary plans now in effect in the United States. "Anyone concerned with the urgent problem of 'private' versus 'socialized' medicine" should read this interesting and well written book.

COL. H. P. MARVIN, USA, RET.

PSEUDOMONAS AERUGINOSA INFECTIONS. By Claude E. Forkner, Jr., M.D. 104 pp. Grune & Stratton, New York and London. Price $5.25.

This publication is one in a series of Modern Medical Monographs edited by Irving S. Wright, M.D. Although, as stated in the preface, personal experience of the author in managing infections due to *Pseudomonas aeruginosa* has been limited largely to care of patients with malignant disease, the monograph presents a careful review of pertinent literature. Considered in important details are: Characteristics of *P. aeruginosa;* Clinical manifestations of infection in various body systems; Antibiotic therapy; and, Pathology. A brief summary concludes the text. Contributing to the value of the monograph is a list of 465 references. The book is attractively bound, the contents are easily read, and it is recommended as a ready reference for clinicians and bacteriologists.

L. A. BARNES, PH.D.

PROGRESS IN EXPERIMENTAL TUMOR RESEARCH. Edited by F. Homburger, M.D. 18 contributors. 476 pp., illust. J. B. Lippincott Company, Philadelphia and Montreal. Price $22.00.

This compendium of 13 monographs in basic tumor research serves as an excellent, well organized review of recent progress in cancer research. The topics are divided among sections on virology, carcinogenesis, tumor inhibition, and tumor biochemistry. The authors represent a wide geographic selection and are recognized authorities in their respective fields. In each of the various articles a review of the specific problem is included and each is accompanied by an excellent bibliography. The text and tables are clear and legible and the photographs are excellently produced. The photomicrographs include several from electron microscopy.

The subjects covered are so comprehensive that a specific review of each article is considered impractical. Suffice it to say that the most recent developments in the broad field of cancer research are well covered in this single volume, which is highly recommended for all interested in cancer research, diagnosis or treatment. In this day and age of rapidly changing concepts in neoplastic diseases it appears to us that every physician could well profit from the material contained in this volume.

CDR JAMES J. HUMES, MC, USN

SURGICAL ERRORS AND SAFEGUARDS. 5th Ed. By Max Thorek, M.D., LL.D., SC.D., F.I.C.S., F.B.C.S. 24 contributors. 652 pp., 455 illustrations, many colored. J. B. Lippincott Company, Philadelphia and Montreal. Price $25.00.

The appearance of a fifth edition of this work, and the adoption of multiple authorship, testify to its permanence in our literature. The negative approach of how *not* to do an operation makes for

absorbing reading, but the authors are at their best when switching to a positive report of how they *do* manage their particular procedures.

The immensity of the subject matter in a small volume has resulted in some inconsistencies. If aortic valvuloplasty merits detailed discussion, why should there be no mention of safeguards in portacaval shunt, abdominal aortic grafts, and endarterectomy?

Some of the contributors have written brilliantly, such as Dr. Neal Owens on plastic surgery. An innovation is the absence of any identifying data about the contributors, other than their names.

DAVID WYATT AIKEN, M.D., F.A.C.S.

COMPARATIVE EFFECTS OF RADIATION. Conference held in San Juan, Puerto Rico, February 1960, sponsored by National Academy of Sciences, National Research Council. 426 pp. John Wiley & Sons, Inc., New York 16, N.Y. Price $8.50.

The physical relationship of ionizing, ultraviolet, visible and near infrared radiation is well documented in this volume which is a collection of the papers and discussions of a conference held at the University of Puerto Rico in February 1960. The editors and contributors are to be congratulated on their promptness which has made this early and timely publication possible.

To those of us interested in the effects of various radiations on the living cell it has become increasingly obvious that the relatively late-appearing biologic disturbances in function and structure studied by us will never be explained adequately until the mechanism by which the physical energy delivered damages the cell is elucidated. For such, study tools and talents foreign to the biologist must be mastered and applied, such as the measurement of electron spin resonance. Incorporation of such data into biological facts, however, is a difficult synthesis, and keen judgment is required to avoid disastrous consequences.

This collection of papers does not solve the problem but it does offer a fascinating glimpse of the nature of the research pursued. In the opinion of this reviewer the experiments described are aimed at uncovering the fundamental facts defining the interaction between these forms of physical energy and the living cell. It is here that every biologist interested in the effects of radiation must start. Everyone interested in the molecular and atomic mechanisms which allow incredibly small amounts of physical energy to be magnified into serious biological damage must have this reference available. Those radiobiologists who have ignored this area in the past must retrace their steps and return to this problem. It is from work such as is reported here that the mechanism of biological action of ionizing and other radiations will be clarified.

MAJ. MICHAEL P. DACQUISTO, MC, USA

AMERIKA SAMOA: AND ITS NAVAL ADMINISTRATION. By Captain J. A. C. Gray, Medical Corps, U. S. Navy. 314 pp., illustrated; glossary and bibliography. U. S. Naval Institute, Annapolis. Price $6.00.

If you want to know everything about Samoa then read this book.

Doctor Gray, the author, has prepared a complete history of America Samoa which for many years was under the United States Navy Administration. He has written of the complicated customs of the islanders, of the complex problems of administration, of the politics, American, British, and German.

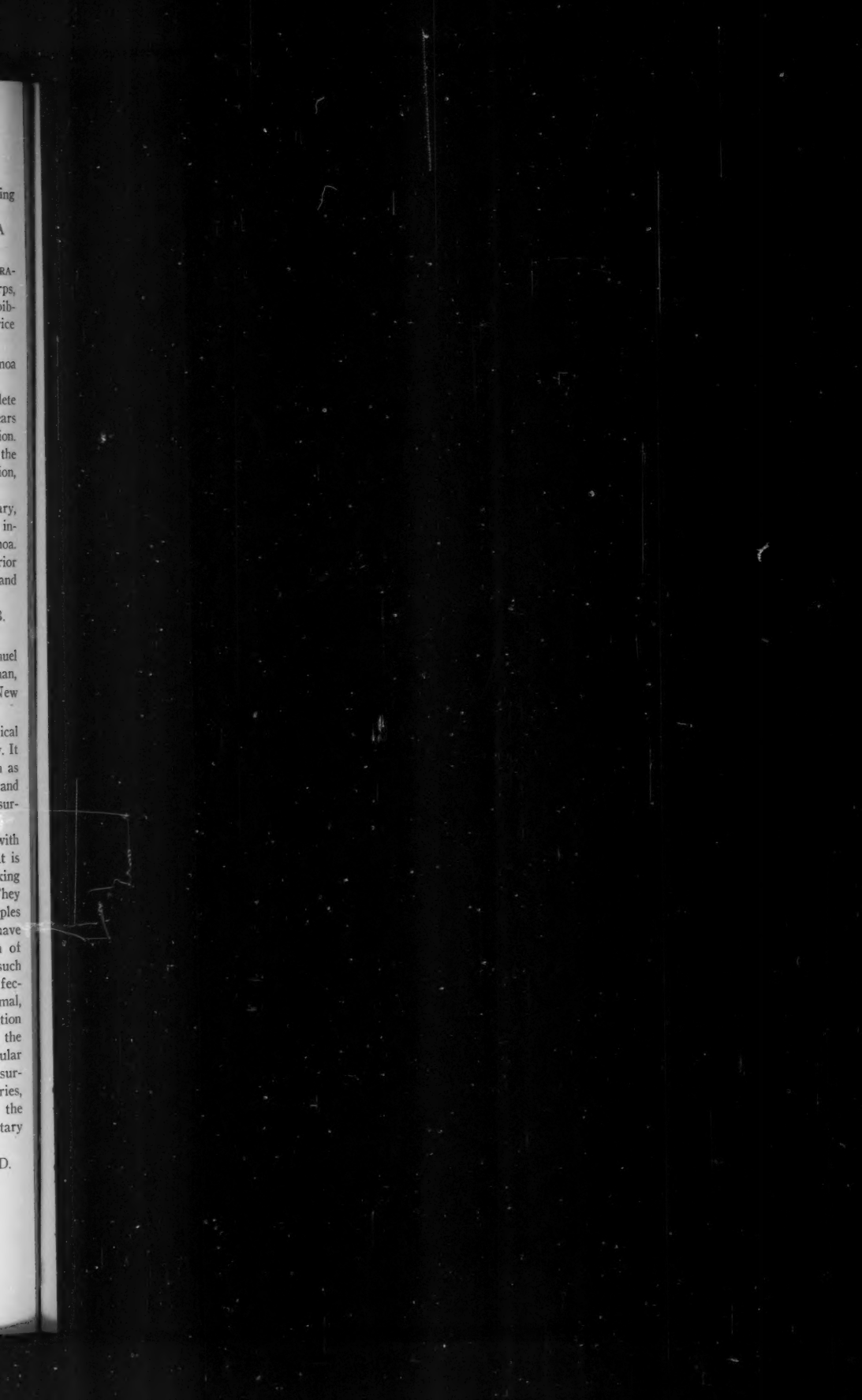
The Notes on the Samoan language, the Glossary, the extensive Bibliography with the excellent index make this book a very valuable one on Samoa.

The author is to be commended for a superior work, the result of many, many hours of study and writing.

R.E.B.

PRINCIPLES OF SURGICAL PRACTICE. By Emanuel Marcus, M.D.; Ph.D.; and Leo M. Zimmerman, M.D. McGraw-Hill Book Company, Inc., New York, Toronto, London. Price $12.50.

This book does not purport to deal with surgical technique but only with the principles of surgery. It discusses the position of the basic sciences such as anatomy, physiology, microbiology, chemistry, and pathology in the understanding and treating of surgical diseases.

The authors point out in their preface that with so many voluminous surgical textbooks which it is impossible for the student to read, they are making no attempt to write another surgical textbook. They are rather attempting to enunciate certain principles upon which all surgical practice is based. They have done an excellent job showing the application of these principles, and of the basic sciences, to such conditions as inflammation; wound healing; infection; shock; pre- and postoperative care; thermal, chemical, electric, and radiation burns; to mention only a few. They also deal very well with the autonomic nervous system and peripheral vascular diseases. They further discuss the principles of surgical practice relative to cranio-cerebral injuries, the thyroid, the breast, surgical diseases of the pulmonary and bronchial systems, the alimentary tract, and many other areas.

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